The Builder.

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Practical Designing.

HAT design should be considered and elaborated with reference to the nature of the material in which it is to be executed is a principle which has now been so lo recognised among us that it may be said to have become a truism which it is unnecessary to insist upon. Many designers, however, especially architects who have hardly time to go far into the processes by which their designs are carried out, may still fail to realise the extent to which not merely the character of the material but the process of manufacture may influence the suitability of the design. Looking at a carpet or other textile, we may at once form a decided opinion as to whether the design is a suitable one to be effective in that particular class of material. But a further investigation into the manner in which the design is worked into the material may show that, while two designs may be equally suitable for the material as far as æsthetic effect goes, one of them may be easy to work and the other very difficult. So, again, with such a material as wrought iron, for which designs are not unfrequently made on paper which might look well enough if executed, but which are exceedingly difficult to execute; a spiral or other feature may be designed of a section which would be effective enough in appearance, but which is exceedingly difficult to bend into the required curve; and so on. This element of practical workability, so to speak, runs through almost all materials which are used as vehicles for decorative design; there is the question of what will look best in the material, and behind that the question of what can be executed best.

It is in order to draw further attention to this point, as well as to assist students of decorative design in a knowledge of the practical conditions of various processes as bearing on design, that the handbook bearing the title which heads this article* has been produced, consisting of a series of short essays on the practical considerations to be kept in mind in designing for various classes of materials and manufactures, and in preparing the working drawings from which the designs are to be carried out. The book is concise in its literary portion, and sufficiently illustrated for practical purposes of exposition; and it is one which ought to be of interest to all architects and decorative designers.

Mr. Millar, in treating of the preparation of designs for carpets, reminds the reader of several points which are very likely to be overlooked by those who have not considered carpet designing from a manufacturer's point of view. The pattern consists of "patches of colour with sharply-defined edges," and has to be so designed, if t[illegible]lt is to resemble the design. "The designer should never forget that his sketch must be reduced to a definite number of tints when being put on lines." This is a limitation which it is surely most important that the designer should have fully assimilated before he puts brush to paper at all. There are one or two points touched upon in the essay which are after all rather æsthetic than practical, but which are very important. We entirely concur with the author in the maxim, to which he calls special attention by putting it in italics, that in a carpet "form must always be a secondary matter as compared with colour." There is one point touched upon by Mr. Millar as a reason for this secondary importance of form, viz.: that a carpet in use is always seen, as a whole, in sharp perspective, with the pattern more and more foreshortened as it recedes from the eye. That is important and is doubtless often overlooked. But even independently of that question of perspective, we hold that form is of secondary importance for the reason that the nature of the material is not such as either to define form sharply or to carry out symmetrical forms with complete precision; and this, as we remember remarking in speaking of the Gobelins tapestry exhibits at the Paris Exhibition of 1889, applies just as much to this class of work when hung on a wall as when placed on a floor; and more to carpets than to tapestry, because symmetry of execution in a design, as far as line goes, is even less under control than in the manual process of tapestry. The object of a carpet is to produce a rich and harmonious colour effect, and Mr. Millar complains that some designers seem to work on exactly the same lines as if they were producing a thing in monochrome. We must refer the reader to the book for the interesting and practically arranged information as to the process of "planting" a carpet design, and the avoidance in a repeat pattern of details which will lead to "striping" when the carpet is seen as a whole—one of the most difficult things to provide against in every kind of repeat design, as many an otherwise pleasing wall-paper testifies; and striping is more likely to develop in the foreshortened horizontal carpet surface than in the vertical wall-paper. We may also draw attention to the note that in designs for the Brussels make of carpets the drawing should not be too thinly coloured, as an effect is produced on paper which is not realised in execution. The designer must face the fact that he is dealing with a colour design which has to be produced mechanically in defined patches of colour, and must define them well in his drawing if he does not wish to be disappointed in the ultimate result. This is a consideration which in fact would apply to all colour design which has to be mechanically reproduced: the designer must guard against being deceived by the effect of freedom of manipulation with the brush which cannot be reproduced in the executed work. In regard to light and shade Mr. Millar observes that the power of indicating this by solid masses of colour is much better developed among French designers than English. He admits that light and shade *should* not have anything to do with carpet design, but urges that the average householder has not arrived at this point yet. Then let him arrive as soon as possible. Why desire to train draughtsmen into a proficiency in representing what it is admitted they ought not to represent?

In connexion with carpets we may take the subjects of "Woven Fabrics" and "Printed Fabrics," treated of by Mr. Arthur Silver. The first-named subject, as the author observes, is practically inexhaustible in the variety of types it includes. A considerable portion of the chapter is occupied with lace, in regard to which we think the illustrations

* Practical Designing: A handbook on the Preparation of Working Drawings. Edited by Gleeson White. Contributors: Alexander Millar; Arthur Silver; Wilton P. Rix; Owen Carter; R. L. B. Rathbone; Selwyn Image; H. Orrinsmith; and George C. Haité. London and New York: Geo. Bell & Sons. 1893.

of symmetrical designs on "panels" are hardly in keeping with the character of the material. The hints as to the sizes and widths commonly used are of practical importance. The illustrations of designs for muslins we like much better, and there is a most useful practical comparison afforded between the drawing for a Madras muslin pattern (Fig. 6) and a portion of the same pattern photographed from the actual stuff. Here the student can compare the effect of the drawing with the result in the actual stuff, which is very different to the eye; Figs. 8 and 9, given with the same object, are even more instructive, and show emphatically how different the effect of the smaller details may be, in execution, from the effect of a drawing (or diagram we might rather say) even when faithfully followed by the manufacturer. In regard to tapestry, which is next considered, the following remarks are worth special attention:—

"In designing for tapestry do not forget that the actual fabric shows an outline composed of small steps or squares; therefore, in drawing your design, it is well, although you use true and actual curves, to remember that they will be represented in the cloth by horizontal and perpendicular lines; very short lines, probably, perhaps, only $\frac{1}{16}$ of an inch, but none the less strictly perpendicular and horizontal, and not curved. Therefore, if you describe a curve which, before it quickens, is in the main horizontal, you will discover it in the cloth as an actual horizontal line; the same holds good of perpendicular lines; consequently, if you draw a small circular figure the result will in all probability be square, or nea'ly so, but the greater the circumference of the figure to be expressed, the more faithful will it appear. Therefore, if you make a curve which is very subtle, and inclines in a horizontal or perpendicular direction, it must needs be represented by a true perpendicular or horizontal edge; and unless the feature of the design requires this character, it is well to draw your curves so that they avoid making right-angles to the perpendicular."

It will be well for the reader to turn direct from this chapter to the one on printed fabrics, and realise how absolutely different are the method of execution and the objects to be kept in view in preparing the design, from those of woven fabrics, though to the popular mind both kinds are often indiscriminately classed together as "textiles." The remarks on the method of production of machine-printed cretonnes will enable the reader to realise to some extent the cost, care, and ingenuity of mechanical means which go to the production of this class of work, concerning which the author remarks, "I do not know which is more to be wondered at, the skill brought to bear, or the apathy with which the result is regarded." The subject of "Floor-cloths," treated by the same writer, follows this, being really akin to it, as it is a class of design produced by printing from blocks, though with important variations in the conditions of printing; superimposed colours cannot be used with good result, because the second printing falls on the wet surface of the first; and separately printed outline blocks are almost a necessity; at all events we quite agree with the author that "the outline is an indispensable element in floor-cloth design," and has to be printed with greater force and fulness of colour than the surfaces which it encloses. The process, and the means employed, are rendered clearly intelligible in a small space and by the aid of two or three diagrams. We quite agree that complicated arrangements should be avoided, and that the designer should "endeavour to develop originality in the direction of simplicity," but we should not be disposed to emphasise too strongly the idea that geometrical forms are best suited for this material; this idea may tend towards running too much into the likeness of tile design; in fact it is rather a vice of some of the popular floor-cloth designs that they too much suggest the idea of an attempt to imitate tiling—some of them indeed are obviously designed with this end. To our thinking there has been rather a want of enterprise shown in floor-cloth design, in the too constant adherence to geometrical patterns of a type which cannot have demanded much thought on the part of the designer. Designs with a certain degree of flow of line in them may certainly be satisfactorily produced in this material, if simplicity and breadth of treatment are observed, and an avoidance of too complicated detail.

Tile design, on the other hand, being necessarily laid down in the form of geometrically-shaped pieces of fixed sizes, most appropriately takes geometrical form in its principal divisions at all events, though there may be any amount of freedom of line in the detail contained on any one tile. Mr. Owen Carter, the author of the chapter on the subject, seems to be of the same opinion; that is in regard to pattern tiles. Decorative figures and large floral designs, worked out in a number of tiles each of which supplies a part of the design, hardly come under the proper category of tile design; they may rather be regarded as wall paintings put together in separate pieces. Tile design is essentially design made up from square pieces each of which is complete in itself.

The subject of wall papers completes the class of surface design and is treated, as far as can be in so short a space, by Mr. Haité, who gives a very good outline both of the practical and æsthetic view of the subject, accompanied by explanatory diagrams as to the arrangement of repeats, and some very good complete designs as examples of different kinds of effect. His statement, however, that the more severe the treatment of the design the better it will bear repetition, must, we think, be taken in a modified sense. He says that geometrical figures gain by repetition but that an elaborated pattern often loses by it; but this is hardly in accordance with some of his own examples (Fig. 1 and Fig. 29 for instance) and with the common practice of some of the best designers of the day at present. It would be more correct to say that naturalistic designs lose by repetition. Purely geometrical design in repetition over a large surface hardly produces a wall paper of the highest interest, The great success of paper-designing seems to be to give, in a flowing but conventional design, an impression of continuity in spite of its being printed in repeats. Mr. Haité's remarks on the true meaning of "conventional" and "natural" in this class of design (page 292) are very well put.

Mr. Selwyn Image's short paper "On the Making of Cartoons for Painted Glass" takes the very sensible and practical form of a description of his own method, which is the best thing that any competent teacher can do in a limited space, as giving what his own personal experience has recommended as the best. He is in favour of frankly recognising the leading—we should imagine every competent stained glass artist will agree with him there—but of keeping its lines and spaces as simple as possible; enclosing a head, for instance, in a simple band of lead, not following the outline in detail, and throwing out the profile by shading between it and the lead; the same with floral forms. We agree with him (he says that some people will not) in thinking that a rather plentiful use of leads—not letting the openings exceed about 8 in. square—besides being of practical value in avoiding the use of large pieces of glass which may be injured in firing, gives a richness of effect to a window which is an artistic gain.

Mr. Rathbone's paper on metal-work is one of the best and most comprehensive in the book, based on the idea that the first thing which the designer of a piece of metal work has to consider is, "in which of its possible conditions or states the metal should be taken, so that it may most readily assume the form which he has in his mind," so that he may avoid the necessity of having the forms altered afterwards from the first design, and the freedom of the lines injured or broken, "this piece to be made thicker or longer, to leave room for the internal construction, or that curve to have its back broken, or to be marred by an unsightly joint, because it cannot be made in one piece." We hardly agree with Mr. Benson that the British workmen in metals are apt to hold the ideas of designers in disdain, and to take pleasure in overwhelming them with all the difficulties in the way of working out what looks well on paper. That is not our experience, at all events; we have generally found that a good workman, though he may (and very wisely) point out to the designer where there would be a practical difficulty, is rather desirous to afford all the help he can in carrying out a design, especially if it has any quality of novelty and originality.

"Drawing for Reproduction," by the editor of the book, is one of the most useful chapters for architects in these days when photographic reproduction of one kind or another has also entirely superseded engraving. Mr. Gleeson White divides processes for typography into "direct reproduction" and "half-tone" blocks. He is unnecessarily positive in his reiterated demand that the former should be drawn in absolutely black ink; brown produces just as well; the defect is that in the case of blocks to be printed with printed matter, the artist does not realise the effect which his drawing will have so well as if it is drawn as nearly as possible of the colour it will be printed. The importance, however, to draughtsmen who make a living by making drawings for the Press, or at least increase their income by it, of knowing precisely what kind of drawing will reproduce best, is very great, and the instances Mr. White gives of the refusal of really artistic drawings which would not produce well, and the acceptance of drawings of far inferior artistic quality in themselves, but by a draughtsman who knew exactly how to draw for reproducing, are quite to the point, and such as happen in real life again and again. Considering that the majority of illustrations in architectural papers are now reproduced by photography, the ignorance of architectural draughtsmen on the subject is often extraordinary, as well as to the method of production as the time it requires. We have several times had a request from the author of a drawing to have some slight alteration made, or to have it (in the case of a photograph) printed in some particular tone, on the very day of publishing, in ignorance of the fact that, if a typographical block, it was made and delivered by that time, and if a lithograph, the copies had been in process of printing for the last three days, and were nearly all made. They seem to think a block or a lithograph can be altered at the last moment, like a printer's correction in type. It would surely be worth their while to know a little more than that. Mr. White might have given them a hint on that point, of which he says nothing, perhaps not believing that anyone could require it. A few words as to the style of drawing might have been added with advantage. It is of the greatest importance that line drawings for reproducing should be clean and even in line, for all blurrs tend to become exaggerated; and especially that line shading should be in clean-cut lines at even distances, and in general not cross-hatched; a good effect may be produced by cross-hatching if very cleanly done, but not in a scribbly way; the intersections of the lines tend to spread and get lumpy; and moreover shading of this kind, which looks free in the original sketch, tends to become unduly hard and pronounced in the reproduction. All these are matters which should have been distinctly pointed out, and the writer's advice is in these respects rather defective. The author recommends one or two American Indian inks (to use an Irishism) as better than any others for drawings for reproduction. Good Indian ink, as we can get it here, is however generally quite satisfactory.

Apart from the points we have noticed, the chapter contains good general information as to the various styles of reproduction that are practised, and the methods of drawing for them. Mr. White notices, we observe, the system of very great reduction from rather rough sketches which is now often employed. He comments on

the failure of such reductions to a minute scale to give the real balance of tone in the original. There is another point in regard to it open to comment; its effect on the draughtsman. The result is to induce a splashy and careless style of drawing, in which general effect only is looked to and detail disregarded, because it would never be seen in minute reduction, which on the other hand gives a general effect of neatness and finish which is totally absent from the original drawing. The public would be surprised to see the originals of some of the charming and apparently delicately executed small tone-blocks which are produced for the American illustrated magazines. We had the opportunity one day of looking over a considerable collection of sketches of architectural interiors in Indian ink, done for this kind of minute reproduction by an artist of great reputation. These would be reproduced on the rolled paper of the magazine, perhaps about one-tenth the height of the originals, and would then appear, no doubt, as broadly executed but delicate little tone-sketches. The originals were large splashes of Indian ink brush work, powerful in general effect but without a bit of recognisable architectural detail in them; and the editor of an architectural journal naturally felt compelled to hint to the eminent artist, as delicately as possible, that architects wanted some definite indication of detail in the representation of architecture. We cannot think that it is a good or a wholesome system which leads to and encourages such a method of drawing, in which delicacy of effect is to be ensured, and the slurring over of detail compensated for, only by the minimising influence of the camera.

NOTES.

IT is openly asserted that the result of the recent ballot of the miners on the three questions alluded to in our issue of the 9th inst. does not accurately reflect the views of the men, sufficient consideration not having been given to the question of resuming work, where possible, at the old rates. Almost immediately after the ballot, some of the miners' agents intimated that they were prepared to ignore the Federation, and to allow any of their men who could do so to return to work at the old rate of wages. This policy has been acted upon in several districts, and more coal is being raised at the present time than for weeks past. This partial resumption cannot fail to have a considerable effect upon the progress of the dispute. An undoubted success is scored by those men who resume, inasmuch as they maintain their position of refusing to submit to the 25 per cent. reduction, "or any part thereof," though their wages will doubtless be ultimately controlled by the terms of the general settlement. It is to be noted, however, that a large proportion of these men were not locked out, having had no notice of reduction. They left their employment of their own accord, or rather at the bidding of their leaders, in sympathy with those who had received notice. The loyalty of the Federation members to the principles of Unionism is thus being severely tested; but, as exemplified at the recent Congress, some of those principles are so purely and unreasonably selfish that they defeat their own ends. For example, the fuel famine, which is rapidly stopping so many industries, is alienating or diverting funds upon which the leaders had evidently relied for support. Many bodies, which might have contributed largely under ordinary circumstances, have enough to do to provide for their own sufferers, thus the dispute. The order has been given to send no coal to the affected districts, although on reflection it would be seen that this course would influence the coalowners of those districts to try and put an end to the strike in order to avoid outside coal displacing their own. Some of the workmen thrown idle for want of fuel can see this, and their sympathy is being surely alienated. It was reported some time since that the London coal trade was driven almost exclusively to the waterside, but there are many large centres of industry with no such alternative, the result being disastrous to numerous branches of trade as well as to the railways. The importation of Continental coal does not appear to have been much of a success, a fact upon which we may congratulate ourselves.

CORRESPONDENCE continues in the *Times* on the subject of betterment in regard to London improvements. Many people may think that the subject is exhausted, but this is not so, for it is only by dint of reiteration in different forms that public opinion is thoroughly educated. Mr. Baumann in his letter points out that those who would have to bear a betterment rate under the Bill, the betterment clauses of which have been recently rejected by the House of Lords, are small owners with an average rating of under one hundred a year. We cannot think that this is a point against the principle; it matters not who the owners are, whether peers or tradesmen, if the tax is a just one and easy to levy. What we have urged is that the subject is one of such great importance that the principle must be applied to all public improvements from one end of England to the other, if it is to be applied at all, and should be embodied in a Bill such as the present Land Clauses Consolidation Act. There is one thing to be said in regard to the recent rejection of the special clauses by the House of Lords, that public attention will now be more drawn to the question, and that it must be decided on grounds of general principle.

THE papers read before the Geological Section of the British Association were not at all up to the standard of previous years. The President's address, to begin with, was of an extremely elementary character, such as might have been written by anyone possessing a slight acquaintance with the science, and very different to what was expected in the time of Murchison, Sedgwick, and Lyell. If the sole intention of Mr. Teall had been to provoke discussion there would have been plenty of it, but the election of such an authority on petrology was looked upon by all geologists as a fitting occasion for a learned discourse on his particular subject—in which they were sorely disappointed. The paper by Professor Clowes recording the occurrence of barium sulphate as a cementing material of a Nottingham sandstone was of much interest, and will doubtless stimulate others to instigate inquiry on the same grounds. Professor Hull's paper on the water-bearing capacity of the new red sandstone at Nottingham does not seem to be a very wonderful production, and might well have found vent on some less auspicious occasion. The endeavour to define the limits between geology and geography, also, was mere waste of time; the proper limits assigned to each, and recognised long since, were well brought out by Professor Bonney when he remarked that whilst the one was a description of the surface of the earth, the other was a science relating to the whole earth, and that the two were indissoluble. The paper, which occupied a large share of Monday, and attracted the attention of both biologists and geologists, on fossil and recent coral reefs evoked nothing new; and if the advantages of the science from a practical point of view were gauged from what dropped from the speakers on Wednesday, when the claims of the science to be taught in schools were advocated, we should not be surprised to find that their appeal fell on deaf ears. The fact is that the average professor of the science is far too much wrapped up in the theoretical bearings of his science to know anything whatever concerning the extent of its practical applications, and he is, therefore, unable to state a fair case.

THE Electrical Congress at Chicago has carried off several of our leading electricians, and consequently the subject of electricity is not so well represented this year at the British Association meeting as is usually the case; many papers that would probably otherwise have appeared there, having been read and discussed on the other side of the Atlantic. Of the fragments that remain, not the least opportune in these days of coal crisis is Mr. Albion T. Snell's paper on "The Utilisation of Waste Water-Power by Electricity." Mr. Snell discusses the reasons why water-power, so largely used on the Continent as a source of electrical power, is yet so little used in Great Britain. Chief amongst these are the relative cheapness of coal and the small supply of water-power in the neighbourhood of places where electrical plants would be commercially profitable. He doubts, however, whether coal at so cheap a rate will always be obtainable, and holds that we might well "make the most of such water-power as we have as an adjunct to, if not as a substitute for coal." He instances the water-supply of Liverpool, Manchester, and Greenock, as cases where an enormous amount of power is wasted which might be advantageously used for lighting the various towns in their vicinity. But when he proposes to dam numerous mountain streams which "might thus be converted into reservoirs for feeding turbines," we feel compelled to protest against such sacrilege. A mountain stream has a value which cannot be expressed in £ s. d.

THE discussion of the subject of earth tremors was an interesting feature in the British Association proceedings. Mr. Symons gave the report of the committee appointed to investigate the cause of the sinking of land in the mining districts of the north of England, and reviewed and described various instruments for recording earth tremors. The difficulty in all these instruments seems to be to make them record exactly the kind of tremor they are required to record, and omit the record of accidental tremors, such as those caused by a cart passing. Of course an ideal tremor instrument should be out of the scope of all accidental disturbance. Professor Milne, in his report on the work of the committee appointed to investigate the earthquake and volcanic phenomena of Japan, admitted also that in a violent storm of tremors the recording instrument became irregular in its action and, as he expressed it, "altered its zero," so that accuracy of observation was impossible. This seems to be an inherent difficulty in the attempt to measure earth tremors. The datum is itself on the trembling earth; for ideal accuracy we should require a datum unconnected with the earth's surface. Still, the highly ingenious instruments which have been invented for the purpose have no doubt enabled us to add very largely to our knowledge of the phenomena of earthquakes and tremors. An interesting point to our readers is the announcement by Professor Milne that the committee's reports had led to a practical alteration in the design of bridges in Japan, so as to resist the shock of earthquake at those points in the walls or piers which had previously been found most liable to give way. We hope to get some more information in regard to this subject. In the course of the discussion Professor Lodge made the important suggestion that the weight of water, flowing and receding with the tide, might account for some periodic movements of the earth. He suggested that Liverpool and Birkenhead were probably "tilted" to some extent by the mass of the

Mersey tidal water flowing in between them. There are competent scientific observers in Liverpool who could take up the investigation of this point; the result might be of considerable interest.

AMONG the practical papers read at the British Association we have received reprints of two, one by Mr. Ashwell, of Nottingham, on Warming and Ventilation, the other by Mr. Warner, also of Nottingham, on the Disposal of Refuse. Mr. Ashwell's is an admirable and well-illustrated paper representing the advantage and even necessity, for large public or private buildings, of mechanical ventilation, and the futility of so-called natural ventilation. The writer gives a good many reasons in favour of the plenum system in preference to the vacuum one. There is something to be said for both, but one decisive advantage the plenum certainly possesses in the fact that on that system we can choose where to draw the air from with much more certainty than in the vacuum system.

THE paper by Mr. E. A. Hawkins, at the British Association, on "Science Teaching in Public Schools," should receive the attention of those engaged in education. Mr. Hawkins speaks strongly in favour of experimental teaching, which according to him is neglected in many cases in order to save time and trouble. He has known, he says, "splendid examinational results" obtained without a single experiment having been performed by either teacher or pupils, but with what results? One who had obtained a first class in the advanced stage in this way could teach nothing when he became a teacher. It is astonishing, says Mr. Hawkins, what mere drawings on the blackboard will accomplish, in the hands of a clever teacher, towards the passing of examinations; but they are disastrous to real science. We hope these remarks will be pondered.

FROM an account given in the *Leicester Daily Express* of a few days back, there appears to have been some disgraceful work going on at Leicester in the disposal of sewage. It is actually stated that "notwithstanding the frequent official declarations that sewage is no longer discharged into the river from Leicester, men have been found by the police in Corporation-yard in Jarvis-street, emptying human *excreta* into the river at the rate of some seven tons in a single night." What the Sanitary Committee of the Corporation, upon whom is charged the *onus* of this disgraceful proceeding, have had to say in their defence has not reached us. As the local journal truly remarks, if the Committee was aware of what was being done, "its offence against the people of Leicester has been grave beyond description."

WITH reference to the arbitration under Lamb and Another *v.* The Secretary of State for War, we may recall the appeal to the House of Lords, wherein, on May 12, 1891, Lord Herschell delivered a long and interesting judgment—*in re* the Attorney-General *v.* Emerson and Others—affirming that of the Court of Appeal. Litigation had extended over twelve years, turning mainly upon a claim by the lords of the manors of Great and Little Wakering, with that of Foulness, whose ownership was traced from before the making of Domesday Survey, to the foreshore itself, as well as to their kiddle (or stake-net) fishery rights. Justices Cave and Mathew, sitting in the Queen's Bench, had given judgment substantially for the Crown, as using the foreshore for the artillery range at Shoeburyness. The Court of Appeal reversed this decision, so far as it was against the defendants, thus allowing their claim to certain parts of the Maplin Sands as belonging to the manors—namely, all that part of the foreshore over which their fishing rights extended. A survey of 1598 and other evidence seem to show that the physical features of the shore have undergone some change, which, however, did not affect the question at issue. Unity of possession of the two manors of Wakering has continued since 1272; in 1419 they belonged to Joan, Countess of Hereford, who, dying on April 7 in that year, left as her heirs Henry V. and the Countess of Stafford. On partition of Joan's estate in 1421 the manors were assigned to the Countess of Stafford. An account of profits rendered by William Daunger, bailiff during the period 1419-1421, for the Crown, contains many items worthy of notice by antiquaries and students of the topography of this part of Essex. In 1612 Sir George Coppin bought the manor and lands of Wakering for 14,000*l.*, a purchase confirmed by James I. by an instrument (under proceedings for curing defective titles), granting and confirming all "lands within the flux and reflux of the sea . . . . . adjacent to the aforesaid manors . . . . . and situate or lying between the manors and the high sea." His lordship held this to be a clear recognition by the Crown that the foreshore between the land boundary of the manors and low-water mark was vested in the manor-lord. In the middle of last century, the Lodwick family came into possession of, and retained until quite recently, parcels of the manor known as Le Sand, Mablyn Swin, and Southcroft. The *Daily News* is informed that in the arbitration case Mr. W. C. Gully, Q.C., has issued his award at 32,500*l.* Colonel Lamb and Dr. Moffat claim compensation in regard to 6,200 acres of the Sands required for military purposes by the Government, and to a further 8,000 acres detrimentally affected thereby. The highest valuation for them was one of 192,000*l.*, assessed by Mr. Charles Pierson, of Manchester: Sir John W. Ellis's calculation on the side of the War Office was for 10,000*l.*

"DESECRATING STONEHENGE" is the title of a letter published in the *Standard* of Monday last (18th inst.), by a writer adopting the *nom de plume* "Archæologist." He relates that on a recent visit to Stonehenge he was disgusted to see the ancient pile overrun by swarms of children, who had, apparently, made it the rendezvous for their annual treat. They were scribbling on an erect stone, making a slide down another, and endeavouring to cut their names on a third. We are afraid that a similar account might be given by many an archæologist who has visited those remarkable remains. If school children are absent, the tourist is ever present, and eager to hand down to posterity an indelible record of his visit to this "Temple of the Druids," as occasion permits; and every one knows that the place has for years been the popular resort of picnics and pleasure parties from Salisbury and the neighbourhood. On the first occasion of our visiting "The Stones" (as they are called in the district) we found a large party of cheap trippers playing at "kiss-in-the-ring" within the enclosure. Now and then a vigorous appeal is made to preserve what still exists of the grand old pile; we hear of the erection of palisading and other remedial measures to keep the vulgar from its precincts; the "Ancient Monuments Protection Act 1882" is freely referred to, and then things relapse into their former quiescent condition. There used to be an old man wandering about the place who had a thick stick, and did what in him lay to keep a species of order; but judging from the observations of "Archæologist" practically nothing is now done to stay the hand of the spoiler, and the present state of affairs is as disgraceful as ever. There is comfort in the reflection, however, that, a few years since, the only public-house along the direct road from Salisbury was closed, and that, probably, will have more effect in checking the stream of "tourists" towards Stonehenge than will any number of legislative enactments.

THE Dunmore Estate, Stirlingshire, will be put up for sale next week. The property extends over 4,000 acres, and the mansion, which was rebuilt, in the Elizabethan style, about seventy years since, stands amongst fine scenery, and overlooks the Forth. Dunmore (or Elphinstone), in Airth parish, has long been a seat of the Earls of Dunmore, descendants of Lord Charles Murray, son of the first Marquess of Athole, and Queen Mary II.'s Master of the Horse, who was elevated to the Scots peerage as Earl of Dunmore in August, 1686. In Airth is the castle, described by Messrs. MacGibbon and Ross, architects, in their work, "The Castellated and Domestic Architecture of Scotland,"* which is especially noteworthy as exhibiting both the open bartizan, and its successor, the roofed angle-turret, and for the peculiarity and beauty of the ornaments of the tympanum, and careful design of the mouldings, in the east front dormers. One dormer represents fern foliage, the other has a star-spangled field. They assign the castle to, probably, the early years of their "fourth period"—1542-1700: it represents what had been known as "Wallace's," from the circumstance that Wallace surprised and cut off an English garrison quartered therein. Of Dysart, Fifeshire, with Ravenscraig Castle and the St. Serf Tower, which will be again offered for sale on the 27th inst., we gave a short account on January 16 last year.

OUR contemporary, the *Engineer*, in its last number, publishes plates from two curious and interesting instantaneous photographs of a large gun by Krupp at the moment of the discharge. The interesting practical part about them (or one of them) is that the first one, taken at the moment after the projectile has cleared the muzzle of the gun, shows the smoke expanding in globular form directly from the muzzle, showing evidence of a great rending force at the point of escape, which justifies the practical wisdom of the older gun-founders in thickening the muzzle of the gun, a device which was probably not adopted merely for "ornament." The point is of interest to others than artillerists, as an illustration of the manner in which an explosive force acts. The photograph shows that the grooves in the rifling of the gun have impressed themselves on the issuing mass of smoke, which is ribbed, somewhat like an enormous melon.

THE "Brown Book" of the Architectural Association, which has been issued, grows thicker year by year, an indication we hope of the continued and increasing prosperity and activity of the Association. The instruction lectures for classes for the session include the following series of lectures:—"The Orders of Greek and Roman Architecture," by Mr. R. Elsey Smith (Greek Travelling Student); "Materials and Construction," by Mr. F. R. Farrow; "Practical Perspective," by Mr. W. G. B. Lewis; "Elementary Physics, as Applicable to Building and Calculation of Strengths," by Mr. R. Holmes; "English Architecture to the year 1500," by Mr. F. R. Farrow; "Materials, their Nature and Application," by Professor Kerr; "Elementary Ornament and Colour Decoration," by Mr. Cole A. Adams; "Stresses and Strains," by Mr. R. Holmes; "General History of Architecture," by Mr. F. R. Farrow; "Geology," by Mr. H. W. Burrows; "Sanitary Science," by Mr. Max Clarke and Mr. Farrow, the latter treating specially of ventilation; "Professional Practice," by Mr. E. T. Hall, who takes as

* Reviewed in the *Builder*, December 25, 1886, January 19, 1889, and August 6, 1892.

his subject "The History of a Commission as affected by Legal Enactments"; "Plane and Solid Geometry," by Mr. R. Holmes; "Colour Decoration," by Mr. J. D. Crace; "Land Surveying and Levelling," by Professor Henry Adams; "Chemistry of Building Materials," by Mr. Farrow; "Quantity Surveying," by Mr. John Leaming; "Practical and Beautiful Design," by Mr. A. Beresford Tite; Lecture on "Painting in its relation to Architecture," by Mr. C. W. Whall; "Sculpture in its relation to Architecture," by Mr. T. Stirling Lee; "Other Arts allied to Architecture," by Mr. Walter Crane. The last nine are noted as "extra subjects." This is certainly a remarkable programme of educational lectures for one society to put forth, and we give publicity to it in order to show those of our younger readers who are not members of the Association what assistance in the study of architecture they may find within their reach by joining it. Among the most interesting in the list of the sessional papers are "How to Study Design," by Mr. A. Beresford Pite (an introduction to the course of class lectures on "Practical and Beautiful Design"); "Hard Wood Joinery," by Mr. H. W. Barnes; "Party Walls," by Mr. Woodthorpe; "Colour in Street Architecture," by Mr. S. B. Beale; "Old Architecture in the East End of London," by Mr. Theodore Moore; and "Practical Remarks on the Working of Wrought Iron, with Examples," by Mr. Henry Longden. The opening meeting, when the President, Mr. E. W. Mountford, will deliver his address, takes place on October 13.

A VERY interesting loan exhibition appears to have been got up at the Museum and Art Gallery at Nottingham Castle, in connexion with the visit of the British Association, consisting partly of works by artists who were natives of Nottingham (R. Parkes Bonnington and Henry Dawson among the deceased, and Mr. Edwin Ellis Mr. Laslett J. Pott among the living), and partly of a special collection of the works of Mr. Walter Duncan. We are not told for what special reason this painter's works have formed an important element in the collection, but we are glad to hear that a collected exhibition has been formed of drawings of a water-colour artist who does not appear to us to have ever received the degree of recognition, by the general public at all events, to which his power as a designer and colourist entitle him, and we recommend those who are in the neighbourhood not to lose the opportunity of seeing this collected exhibition of his works. The catalogue, of which a copy has been forwarded to us, is very well got up, and illustrated by a good many sketches, chiefly of Mr. Duncan's drawings.

BUILDING MATERIALS AT THE CHICAGO EXHIBITION.*

TWENTY-FIVE States and Territories are represented in the Mines and Mining Building by collections of building-stones. One or two States, in addition, make their displays in their own buildings, notably Illinois, so that the total might be increased by a few more. No one system has been followed in preparing the exhibits of building-stones, save that of omitting any information which would render them of practical value to the architect. This, however, is not so wholly culpable as may appear at first sight, since the building-stones of many of the Western and newer States have not yet been studied by their own geological surveys. But this offers no excuse whatever for the lack of scientific information anent the older States, which not only have long established geological surveys, but which have published monographs and papers upon this very subject.

Building-stones are shown, in one form or another, by the following States:—Arizona, Colorado, Connecticut, Idaho, Indiana, Iowa, Louisiana, Massachusetts, Michigan, Minnesota, Missouri, Montana, New Hampshire, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Utah, Vermont, Virginia, West Virginia, Wisconsin and Wyoming. This list includes only States having exhibits in the Mines and Mining Building. Illinois, which makes her exhibit in her own building, is thus omitted, as is Washington and one or two others. Some of these exhibits are small—Arizona, for example, being represented only by some specimens of onyx. But a number of the others are very complete, and, taken with the general collection in the galleries, makes a display which, in point of numbers, in variety of specimens, in richness, and in ampleness of resource, make a creditable and interesting display. Yet there is the same lack of information and the same deficiency in labelling which is so grievous a fault of the topical collection made by the Exhibition authorities.

Several States make really important displays of their resources in building-stone. New York is especially notable in this respect, the specimen blocks being of generous size, cut to show the stone in its natural and prepared state. New York is amply supplied with quarries of building-stone of excellent quality and great variety, many of the larger towns throughout the State being built from stone quarried in their immediate vicinity. The collection of specimens is, therefore, a fine one, both in variety and in quality, though the scope of the exhibit seems to have included no plan whereby this latter element might be ascertained. Special mention should be made of the care shown in arranging the collections, which, in this respect, is superior to that of other State displays. Ohio is another State that makes a fair showing with its building-stone. At the Philadelphia Centennial Exhibition the State erected a building of its stone in Fairmount Park, but at Chicago it has contented itself itself with erecting a stone enclosure to its space in the Mines and Mining Building. Pennsylvania likewise has an extensive collection, the older and more thickly settled States thus appearing to greater advantage than some of the newer ones whose products may be quite as rich. But this cannot be said of Colorado, the larger part of whose surface is filled by the Rocky Mountains, and which thus produces an extraordinary variety of building-stone. In a few years this industry will doubtless be developed, but meanwhile it is well to point attention to the great variety of sandstones and marbles shown in the form of columns, which make part of this State's display. Visitors to Colorado will readily recognise a reddish sandstone, abundant in the eastern part of the State, and which, being extensively used for building purposes, gives a characteristic appearance to its cities. Very different in appearance and in quality is the "Jasper" of Minnesota, a purple stone much used in the cities of St. Paul and Minneapolis. Both these stones, being of local origin, are not much used in other portions of the United States, and the cities of Colorado and of Minnesota are remarkable in containing buildings of these distinctive stones. The variety of stone used in the larger number of American cities is so great, and the stone is obtained from such varied sources, that the individuality of appearance from this source is scarcely noticeable elsewhere.

It is manifestly impossible to make, in this place, a detailed summary of the building-stones of the United States. The materials for such a compilation are not furnished by the collections at the Columbian Exhibition, while the subject is one of greater interest to American architects than to British. It is sufficient to note that a large number of specimens have been brought together that, considered as a whole, richly illustrate the building resources of America. But the want of scientific data whereby the quality and durability of the stone may be estimated deprives the collections of the larger part of their value. In order to show how varied the resources of the United States are in this field the following table has been compiled, giving the localities, by States, of the more important building-stones. It is based upon the report of Mr. George P. Merrill on "The Collection of Building and Ornamental Stones in the U.S. National Museum," contained in the Report of the Smithsonian Institution for 1885-86 (Washington, 1889):—

Geographical Distribution of Building Stones in the United States.

Granites.	Gypsums.	Limestones and Dolomites.	Marbles.	Porphyries.	Sandstones.	Serpentines.
—	—	Alabama	Alabama		Alabama	—
—	—	—	—	—	*Arizona	—
—	*Arkansas	Arkansas	Arkansas		*Arkansas	—
*California		*California	California		California	*California
*Colorado	*Colorado	Colorado	Colorado		Colorado	—
Connecticut			Connecticut		Connecticut	Connecticut
†Delaware			Delaware			*Delaware
—	—	Florida	—	—	—	—
*Georgia			Georgia	—	—	—
Idaho			Idaho		Idaho	—
—	*Illinois	Illinois			Illinois	—
—	—	Indiana			Indiana	—
Iowa	Iowa	Iowa	Iowa		†Iowa	—
—	—	Kansas			Kansas	—
—	—	Kentucky			Kentucky	—
Louisiana			Louisiana		Louisiana	—
Maine		Maine		*Maine		Maine
Maryland			Maryland		Maryland	Maryland
Massachusetts			Massachusetts	*Massachusetts	Massachusetts	Massachusetts
—	—	Michigan			Michigan	—
Minnesota		Minnesota		*Minnesota	Minnesota	—
*Missouri		Missouri	Missouri	*Missouri	Missouri	—
—	—	—	—	—	*Mississippi	—
Montana		Montana	Montana		*Montana	—
—	—	Nebraska	—	—	—	—
—	—	—	—	—	*Nevada	—
New H'mpshire	—	—	—	—	—	—
†New Jersey				—	New Jersey	*New Jersey
—	—	—	—	—	*New Mexico	—
†New York	*New York	New York	New York		New York	New York
North Carolina		North Carolina	North Carolina	*North Carolina	North Carolina	*North Carolina
—	*Ohio	Ohio			Ohio	—
—	—	—	—	—	Oregon	—
†Pennsylvania		Pennsylvania	Pennsylvania	*Pennsylvania	Pennsylvania	Pennsylvania
Rhode Island	—	—	—	—	—	—
South Carolina	—	—	—	—	—	—
—	—	—	—	—	South Dakota	—
†Tennessee	*Tennessee	Tennessee	Tennessee		*Tennessee	—
*Texas		Texas	Texas		*Texas	—
Utah			Utah		*Utah	—
†Vermont			Vermont			Vermont
Virginia	*Virginia		Virginia		Virginia	—
—	—	—	—	—	Washington	—
—	—	West Virginia.			West Virginia.	—
*Wisconsin		Wisconsin		*Wisconsin	Wisconsin	—
†Wyoming	*Wyoming	—	—	—	—	—

* Quarries not much worked, though quantity is frequently abundant. † Small amounts only.

Comparisons have been made with the State exhibits at Chicago in order to prevent possible errors and omissions, and the list is, therefore, more complete than that contained in Mr. Merrill's report. It may be noted that a great variety of stone is included under the head of "Sandstone," many of which are peculiar to the United States. It has, however, not been feasible to separate these out in the space we can devote to the subject. It should be added, also, that many of the quarries are as yet only slightly worked, and future demands may lead to other discoveries and developments which would add considerably to the list herewith submitted.

In bricks and brick-making clays the United States takes the lead, as it does in building-stone. With the exception of artistic tiles, the other countries contribute very little to this department. The British collection is small, though several firms send collections of cement, sand, and fullers'-earth. The single exhibit of glazed brick is made by the Farnley Iron Company,

* Continued from p. 206 *ante*.

Limited, of Leeds. The State collections in the Mines and Mining Building contain a considerable variety of bricks and clays. That shown by the State of New York is the largest and most comprehensive. Though the specimens are few in number, they are taken from a great variety of sources, and the clay products of the State are, in consequence, very well illustrated. The collection includes building-brick, fire-brick, stoneware, and clays. Several sections of drain-tile are shown, some square in section, others circular within a square, while still others are oval, within and without, made in various sizes and sections. A few tiles are also shown. Pennsylvania comes next in completeness of clay exhibits, and shows quite an extensive line of the famous brick products of that State, especially of brick from Philadelphia and its near vicinity. Bricks and clays, or clay products, are also shown by the States of Colorado, Indiana, Iowa, New Mexico, Virginia, West Virginia and Wisconsin. As brickmaking clays of very good sort abound in nearly all the States, it will be seen from this list that the exhibits under this head are notoriously incomplete. In fact, were it not for the collections made by the States of New York and Pennsylvania, this industry would be scarcely represented, since the collections made by the other States are small and unimportant.

The most important brick exhibits are not placed in the Mines and Mining Building, but in the Manufactures Building, where they are classified in Group 91 of "Ceramics and Mosaics." The collections we have thus far been considering are classed under Group 46 in the Department of Mines, Mining, and Metallurgy; Class 304, "Clays, kaolin, silex, and other materials for the manufacture of porcelain faïence, and of glass, bricks, terra-cotta, tiles, and fire-brick." The exhibits in the Manufactures Building are in Class 574, "Bricks and terra-cotta for building purposes, plain and enamelled," &c. This is an instructive illustration of the manner in which allied subjects may be separated when their organic connexion, which, in this instance, happens to be architectural, is ignored.

The foreign exhibits in this group may be passed over, since there is nothing calling for a moment's consideration, though an exhibit of Adamant Stone by Francis & Co., Lim., London, may be mentioned. In the American section the exhibits are more numerous, and several are of great interest. The most notable exhibit is that made by the Hydraulic Press Brick Co., of St. Louis. This company has branches in nine of the chief cities of the United States, and manufactures a very large line of brick, the special quality of which is that it will not absorb water. Its exhibit is in the form of a series of rooms, open at the top, and built of its products, the walls being lined, within and without, with specimen bricks, plain and moulded, and of various colours. It is arranged with excellent taste, and is one of the most striking exhibits of constructive architecture in the Exhibition. The range of colours is very large and extremely good.

Another notable exhibit is made by the Pioneer Fire-proof Construction Co., of Chicago. This firm, as its name implies, manufactures fire-proof building materials, and its products are extensively used in high buildings and other important structures in America. Its exhibit is designed to illustrate its great variety of products, and includes examples of hollow tiles, glazed and unglazed, used for walls, chimneys, enclosures, &c., and the same products applied to floor construction in flat arches between I beams, known as the "Johnson Patent End Section Arches," or in segmental arches filled in with cement and useful for long spans. Suspended ceilings are also shown, consisting of light tiles held by T irons. A similar method of support is applied to roofs, which are likewise shown. Further specimens illustrate fire-proofing applicable to iron columns. Though the products of this firm are especially intended to be applied to the fire-proof construction of large buildings into which no wood enters constructively, it also undertakes to apply its method to wood buildings, practically by lining them with the fire-proofing. The chief application of this method, which is said not to amount to more than eight per cent. on the original cost, would be in fire-proofing old buildings or structures erected before this system came into vogue. While the exhibit is not large, it is especially notable in being almost the only exhibit in the whole Exhibition which illustrates the latest development of constructive architecture in the United States.

Fiske, Homes, & Co., of Boston, Mass., make an interesting exhibit of "Boston Brick Ashlar." This comparatively new product is intended to replace stone as a building material, and is made in blocks of various sizes, generally with a rough surface, so that a wall built of it approximates a stone wall in appearance. The blocks are heavy and the range of colours good, and while there can be no good reason for making it in direct imitation of stone, it would seem as though, in the somewhat massive effects obtained from it, there might be some advantages in substituting it for stone. It is unquestionably better able to resist fire than any popular sorts of building-stone, but as at present manufactured it is too needlessly an imitation of another material. A somewhat similar substance is shown by the Douglass Moulded Brick Stone Co., of Salem, Ohio, which makes an artificial stone or brick, its specialty seeming to be the impression of various ornaments upon the stone—a system which can neither be commended, nor does it give satisfactory results. The North-Western Terra-Cotta Co., of Chicago, manufactures the same product shown by Messrs. Fiske, Homes, & Co. The exhibit includes photographs of a number of important buildings in which this material has been used, among which may be found some of the newer and more important business buildings in Chicago. The exhibit is in the form of an attractive pavilion built of the products of the company.

The Graham Pressed Concrete Co., of Chicago, make a small exhibit of pressed concrete as a building material. They use a powerful press for pressing the concrete into shape, and produce building and ornamental blocks which are claimed to be suited for every purpose of building. The concrete is made of granite chips and Germania Portland cement, the proportion varying somewhat with the size of the block to be made. A block 4 in. by 12½ in. by 14 in. supported 538,200 lb. before fracture was observed. Pressed designs are shown, together with plain building blocks. The Tiffany Pressed Brick Co., of Chicago, show samples of brick in cases.

The exhibits of woods in the Forestry Building may be conveniently considered in this connexion, and we shall thus have practically exhausted the subject of building materials at the Columbian Exhibition. The exhibits in the Forestry Building, which is located at an extreme corner of the grounds, behind Agricultural Hall, with which, doubtless, it is somewhat connected in the minds of the Exhibition authorities, are extremely good and intensely interesting. We do not remember to have ever seen a finer display of woods than may be found here, and the exhibits are not only fine in themselves but are very complete. The displays are made chiefly by the different States, though several foreign countries are represented, In arrangement, therefore, the contents of this building are somewhat similar to those on the main floor of the Mines and Mining Building.

Foreign countries may be considered first. These exhibits are naturally not large; the most important are those of the Argentine Republic, Mexico, New South Wales, and Japan. Several displays from the West Indies are also made. Of the foreign collections the most interesting is that made by New South Wales. The energy displayed by this colony in illustrating its resources at the Exhibition is worthy of the warmest praise, and the collection in the Forestry Building is not the least important. The exterior of the pavilion is lined with native boards of great size, most of them taking a fine polish and having a good range of colours. The boards are among the largest in the building, and are only exceeded in size by some of the monster boards from California. Photographs of trees and many lesser specimens of wood products add to the interest of the collection. A very interesting collection of woods from Trinidad is shown. The most striking is the "Purple Heart," an extremely beautiful wood, taking a fine polish and of a rich purple colour. It occurs plentifully in Trinidad, and would seem to be an effective material for interior work.

The greater part of the exhibits in the Forestry Building, as in all other buildings, is made up of American displays. It is impossible to speak too highly of the extraordinary beauty of the displays nor of the care taken in their arrangement. New York, which leads in so many departments, is well to the head here in the care with which its collection has been arranged, and in the completeness of its exhibits. A full line of specimens of the chief woods of the State is shown, illustrating their natural growth and natural and polished surfaces. These blocks are supplemented by transparencies of thin sections of wood and by photographs of trees, so that the whole subject of forestry in its natural and manufactured relations is amply illustrated. Similar care is manifested by other States, and the collections made by the great timber-bearing States are very good. A number of them show large photographs of the trees. One or two States show interior fittings made of its native woods, employing as great a variety as possible, and generally arranged with excellent taste. A few individual firms make similar exhibits, the most notable being a large room decorated and fitted up by the Southern Lumber Manufacturing Company. A fine and rich exhibit is made by the State of California, whose wood products vary from those of the temperate zone to those of the tropics. The most striking object in this collection is a huge section of a redwood tree. This plank is 16 ft. 5 in. wide, 12 ft. 9 in. long, and 5 in. thick, and was cut from a section of the trunk 28 ft. from the ground. It is not part of the California exhibit proper, but is exhibited by Berry Brothers, Limited, of Detroit, Mich., as an advertisement for their varnishes. Further examples of California woods are placed in the California State Building. A few firms also exhibit veneers, varnishes, and the like.

On the whole, the Forestry Building is an extremely satisfactory one to visit, for it is almost the only structure on the Exhibition grounds in which a general plan of arrangement and selection has been carried out. At the same time it is to be regretted that the scope of the Exhibition did not include the publication of handbooks which would put the information hinted at by the contents of this building, but not made public in its present state, into the hands of the people. Had this been done in connexion with the Forestry and the Mines and Mining Buildings the exhibits of certain grades of building materials would have left little to be desired.

THE BRITISH ASSOCIATION.

THE annual meeting of the British Association was opened at Nottingham, in the University College, on Wednesday, the 13th inst., in the presence of a brilliant assemblage of scientific men. This is the second occasion on which that town has been selected for the annual gathering, and about 1,600 tickets were taken on the first day.

One of the novel features of the Nottingham meeting was the collection of scientific apparatus and exhibits, which were arranged in the physical and chemical departments of the College. Amongst them we may notice an instrument for registering the intensity of earth tremors, designed by Professor Milne, F.R.S., and called a tromometer. It consists of a rigid vertical support with a horizontal needle loosely attached to it; the needle carries a vertical mirror, and any movement which slightly tilts the support will cause the needle to move considerably, and the motion can be registered by a beam of light thrown on the mirror. Another exhibit by the Cambridge Scientific Instrument Company was Callendar's platinum pyrometer, an electrical apparatus for determining high temperatures in furnaces from the change of electrical resistance of a platinum wire when exposed to the high temperature. The Rev. F. J. Smith had a series of photographs called "inductoscripts," taken by an electrical method, previously alluded to in our columns. The magnetic curve tracer described by Professor Ewing at last year's meeting of the Association was also on view. Messrs. Pyke, Harris & Co. exhibited a laboratory alternator and a transformer; and several munufacturing firms sent their best and newest scientific apparatus, making altogether a useful and interesting exhibition.

On opening the session, the retiring President, Sir Archibald Geikie, F.R.S., informed the members that the affairs of the Association were in a satisfactory condition, and briefly introduced the new President, Professor Burdon Sanderson, who then delivered the inaugural address.

The Oxford Professor commenced by alluding to the immense advantages the company had reaped through the work of the Association, and to the smallness of the pecuniary aid received from public sources by scientific institutions in this country, as compared with some other nations, in consequence of which foreigners have gone ahead of us in several departments. The address chiefly dealt with the status and development of Biology, into which it is not our province to enter. Students of Sanitary Science, however, might take note of the following. The President said it was possible that many members of the Association were not aware of the unfavourable—he would not say discreditable—position that the country at present occupies in relation to the

scientific study of the causes and mode of prevention of infectious diseases. In respect to administrative efficiency in matters relating to public health, England was at one time far ahead of all other countries, and still retains its superiority; but as regards scientific knowledge we were, in this subject, as in others, content to borrow from our neighbours. Those who desire either to learn the methods of research, or to carry out scientific inquiries, have to go to Berlin, to Munich, to Breslau, or to the Pasteur Institute in Paris to obtain what England ought long ago to have provided. For to us, from the spread of our race all over the world, the prevention of acute infectious diseases is more important than to any other nation. He hoped that the efforts now being made to establish in England an institution to further investigate that subject would result in complete success.

On the second day of the session, Thursday, the addresses of the Presidents of the various sections were delivered, and a few papers read and discussed. Mr. R. T. Glazebrook, F.R.S., President of the Section of Mathematics and Physical Science remarked that the Conference at Edinburgh on electrical standards had been followed by important results. Its resolutions and definitions had been adopted by the Board of Trade, and accepted by France, Germany, Austria, and Italy; and there was good reason to believe that the Chicago Congress would ratify them. The British Association Committee, co-operating with foreign physicists had thus secured an international agreement concerning electric units and standards. Speaking of the physical papers of the past year he mentioned amongst others Mr. E. H. Griffith's re-determination of the mechanical equivalent of heat—a work that had taken five years to complete. With the exception of one group of experiments, the results differ by less than one part in 10,000, and they show that 41·94 million ergs of work are required to raise one gramme of water one degree Centigrade at 15 deg. C. Professor Dewar had during the year continued his experiments on the liquefaction of oxygen and nitrogen on a large scale; to the physicist the most important results of the researches were the discovery of the magnetic properties of liquid oxygen, and the proof of the fact that the resistance of certain pure metals vanishes at absolute zero. The remainder of the address dealt with the theory of light, and gave a historical review of the progress made in that branch of science, especially during the last few years.

The President of the Geological section, Mr. J. J. Harris Teall, M.A., F.R.S., discussed the theories relating to the origin of rocks; after which Professor E. Clowes described a Nottingham sandstone containing barium sulphate as a cementing material. He had not been able to obtain evidence of a similar sandstone in any other part of the country. Professor Hull read a paper on the water-bearing capacity of the new red sandstone of Nottingham; in the course of which he remarked that few towns in central England were more favourably situated for purposes of water supply than was Nottingham. Mr. Herbert Bolton, of the Manchester Museum, contributed some observations on the Skiddaw slates of the north of the Isle of Man.

Mr. Jeremiah Head, C.E., Past Pres. Inst. Mech.E., the President of the Mechanical Science section, confined his address chiefly to showing that mechanical science is largely indebted to mechanisms as they exist in nature, if not for its origin, at all events for much of its progress hitherto, and that we must still look to Nature for future guidance. Mechanical science, he said, had been built up entirely upon observation and experiment, and the natural laws which had been induced therefrom by man. The decisive victories which in modern times man had gained over matter, and over lower animals, had been due to his use of power derived from other than animal sources. That power had invariably proceeded from the combustion and the destruction of fuel, the accumulations of which in the earth were necessarily limited. Mechanical appliances involving the consumption of fuel had for a century at least been multiplying with alarming rapidity. Terrible waste of fuel was daily going on in almost every department of use; when Nature's stores were exhausted they could never be replaced; they had been drawn upon to some extent for 1,000 years, and extensively for more than 100. Authorities said that another 1,000 years would exhaust all the more accessible supplies. A paper by Mr. Worby Beaumont on the "Automatic Balance of Reciprocating Mechanism" was then read, as also were others descriptive of local industries dealing with lace and hosiery machinery.

On the third day, Friday, Professor Lodge, F.R.S., gave an account of the progress of his experiments made with a view of ascertaining the behaviour of ether near matter, and he did not now think there was any mechanical connexion between the two. Mr. E. H. Barton and Mr. G. U. Yule read papers on "Phenomena Presented by Electric Waves in Wires," the former dealing with interference phenomena arising from reflection at points where the nature of the conducting wire is changed, the latter with the effect of electrolytes and dielectrics introduced between the conducting wires.

The Geological and Geographical sections combined to listen to a discussion on the limits between geology and physical geography; after which various papers not possessing any features of interest to our readers were disposed of.

In the Economic Science and Statistics section, Mr. E. Cannan, of Oxford, contributed a paper of much interest at this juncture as bearing on certain phases of water-supply. It pointed to the diminution of the net immigration from the country into large towns. Contrary to the general belief that the population of the great towns is being increased almost as much by immigration as by excess of births over deaths, the excess of immigrants over emigrants, or net immigration, is rapidly diminishing, and seems likely to disappear before the end of the century. The net immigration into London in the last ten years was only 56 per cent. of what it was in the previous ten years, and only 63 per cent. of what it was thirty years before, when the population was two and a-half millions less than it now is. In this matter London is by no means in advance of the other great towns. In Liverpool the net immigration was 68,000 in 1851-60, 56,000 in 1861-1870, 49,000 in 1871-1880, but in 1881-1890 the balance was the other way, and there was a net emigration of 15,000.

In the Mechanical Science section two practical papers were read on "The Utilisation and the Disposal of Town Refuse." Mr. C. C. Keep said that it was possible to provide power for generating electricity by the use of Fryer's destructor and the thermal storage which it provided. Mr. W. Warner, in the course of an elaborate review of the methods adopted in the towns of this country for disposing of and utilising refuse, comparing them in cost and efficiency, concluded that electric light, produced by burning refuse, can show economical results only in very exceptional cases. Mr. Elliott urged that the refuse had to be destroyed in any case, and, therefore, the cost of burning it was not to be reckoned. Professor Unwin doubted whether the heat from burning refuse could not be more profitably applied to producing power than to producing electricity. Mr. Frank Ashwell then read an exhaustive paper in which he advocated the plenum principle as opposed to the vacuum principle in the ventilation of buildings, contending that the plenum system had succeeded wherever it had been properly carried out.

In the section of Anthropology Professor Hildebrand dealt with the subject of Anglo-Saxon remains and coeval relics from Scandinavia. From the resemblances between the weapons, implements, ornaments, and other objects contemporary in point of age found in Scandinavia and in this country he argued that there was an extensive communication between Britain and Scandinavia prior to the Anglo-Saxon conquest—a conclusion combated with some degree of warmth in the discussion which followed. A communication was subsequently made by Mr. Romilly Allen "On the Origin and Development of Early Christian Art in Great Britain and Ireland," the object of which was to trace the various decorative elements found in early Christian art in Great Britain to their source, and to show in what way the native styles of art existing in this country at the time of the introduction of Christianity (*circa* A.D. 450) were influenced, first by the Italo-Byzantine art which came in with the importation of the illuminated manuscripts used in the service of the Church, and subsequently by the coming in contact of the Anglo-Saxon and Scandinavian conquering races with the Celtic and other populations already inhabiting the British Isles. Early Christian art in this country is essentially decorative, and to a lesser extent symbolic. The conventional grouping and general treatment of the figure-subjects show that they were obviously barbarous copies of Byzantine originals.

Saturday was more or less a holiday in the sections, but the Mathematics and Physical Science division met to discuss an important paper by Professor Rücker on the "Magnetic Shielding of two Concentric Spherical Shells," one of the objects of which was to demonstrate the most efficient means of preventing a magnet from creating disturbances in surrounding objects. It arose out of the objections by the authorities of the Royal College of Science, and the Central Institution to the proposed course of the South London Electric Railway, on the ground that the magnets moving on its cars would interfere with scientific experiments in their laboratories. The problem could be solved by surrounding the magnet with a very thick iron sheathing, but such a proceeding would add to the weight to be carried on the cars. He had endeavoured to ascertain the thicknesses and radii of two shells in the form of concentric spheres which would give the greatest amount of screening effect obtainable for a given mass of iron.

In the section of Anthropology, Dr. J. H. Gladstone made a communication on "Ancient Metal Implements from Egypt, and the Discoveries of Dr. Flinders Petrie and Mr. Bliss at Tel-el-Heyi." At this place there was a very high mound made out of the ruins of successive towns which had been built, one on top of another, each having been constructed on the ruined remains of its predecessor. This mound had furnished certain chronological details from the time when the Amorites first settled there, until the fall of the place when in possession of the Israelites. As the mound was ascended, there was a change in the materials used for ornament, defence, &c., from copper to bronze, and from bronze to iron. The lead and silver ornaments found were very pure. In the course of the discussion of a paper by the President of the section, Professor Sayce said that a few years ago he found in Upper Egypt, on the eastern bank of the Nile, the remains of a Roman convict settlement, near a range of limestone cliffs, which the convicts were employed in quarrying. Near the foot of the cliffs he discovered a number of flint implements, like those exhibited at the meeting, which he thought must have been used as saws.

On Monday the Mechanical Science section was principally occupied in discussing electrical questions. Mr. Albion T. Snell read a paper on the "Utilisation of the Waste Water Power by Electricity," the principal object of which was to indicate the existence of water-power in various parts of the country available for the purpose. There is a fall of 500 ft. in the water conduit from Lake Vyrnwy to Liverpool, and there must consequently be a considerable quantity of power in it. The series of artificial lakes forming the Manchester waterworks might be utilised to drive turbines and give electric energy for lighting the various towns in their vicinity. The watershed behind Greenock had a fall of many hundred feet.

In the section of Anthropology, Mr. Bloxam read the report on the exploration of ancient remains at Aksum, in Abyssinia, drawn up by Mr. Theodore Bent. Special attention was given to the study of seventy monoliths, in all stages of development, which he found there, the results having chiefly a philological bearing.

At a meeting of the general committee of the Association in the afternoon, it was resolved that the meeting of 1895 should be held at Ipswich.

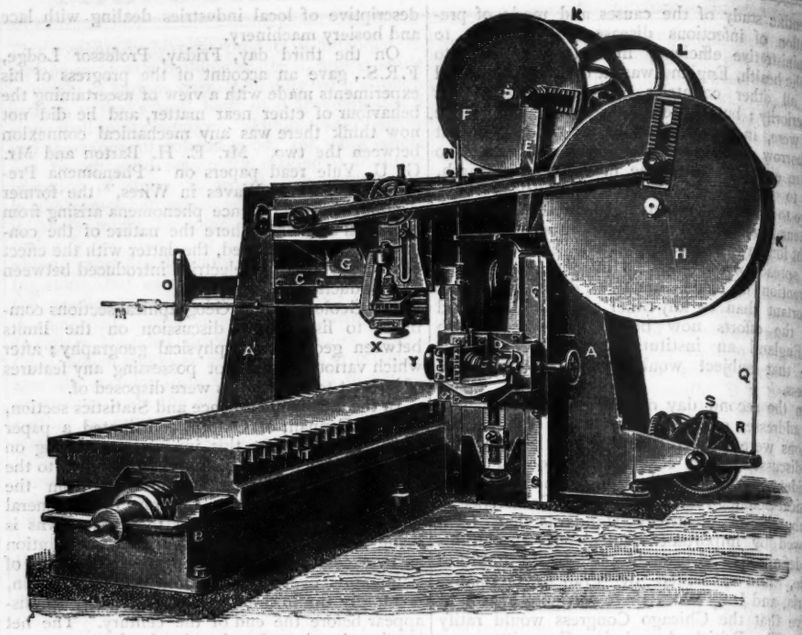
Tuesday was a busy day with all the sections. In the department of Mathematics and Physical Science the President read the report of the Electrical Standards Committee and subsequent papers were of a cognate nature; or dealt with certain kinds of galvanometers, interference experiments, metals for reflecting telescopes, &c. The question of the methods of publishing scientific papers was introduced, and also the teaching of physics in schools. The Chemistry and Mineralogy Section was mainly occupied by a discussion opened by Professor Dixon, of Manchester, on "Explosions in Coal Mines." The section of Geology advocated teaching the science in schools, and then passed to the consideration of glacial theories; whilst the currency problem absorbed the attention of the Section of Economic Science and Statistics.

The Anthropologists considered the structure of lake dwellings. In this communication Dr. Munro described the various methods adopted by the lake dwellers in the construction of the under structures and platforms on which their huts had been placed:—(1) Pfahlbauten, or pile-structures proper; (2) solid basements of wood, or islands made of mixed materials, crannogs, fascine structures, &c.; (3) cellular basements of beams arranged like the logs of a house. After noticing the fragmentary indications of huts collected from time to time on the sites of lake-dwellings, the author described some

recent discoveries at Schussenried, Würtemburg, and in Argyleshire. Professor Herdman read a report on the excavation of a stone circle on the Meayll-hill, Isle of Man. The circle was about 50 ft. in diameter, and consisted of graves, underneath the floors of some of which were found flint implements, arrow-heads, &c., with pottery. Mr. Arthur Bulleid described a British village of marsh dwellings discovered by him last year near Glastonbury. The foundations or floors of the dwellings were constructed in the following manner:—On the surface of the peat was a layer or platform of timber and brushwood kept in place by numerous small piles at the margin. On this a layer of clay was placed, slightly raised at the centre, where the remains of a hearth were generally found. The dwelling itself was composed of timber, filled in with wattle and daub. Not only were the wall-posts found *in situ*, but also the entrance threshold and doorstep. Professor Boyd Dawkins also made a communication on the subject.

The only section which had occasion to meet on Wednesday was the Geological, in which attention was chiefly directed to the structure of certain igneous rocks. The nineteenth report of the Committee on the Circulation of Underground Water was submitted; the final report will be presented next year.

At the concluding meeting of the Association the usual compliments were passed. The Marquess of Salisbury is nominated President for the Oxford meeting in 1894.



Trier's Double-Action Stone-Dressing Machine.

ITEMS FROM A MEDIÆVAL ACCOUNT BOOK.

THE following items have been copied from the manuscript private account book of the last prior but one of the Benedictine monastery serving Worcester Cathedral before the Reformation. The book is now the property of the dean and chapter; it is a folio volume, of paper, and bound in vellum.

In this article the contractions in the MS. have been expanded and the thorn letter *þ* is represented by th.

With the exception of repetitions this article probably represents the various constructive items carried out at the prior's private expense during his tenure of office.

Of Prior More, Dugdale writes: "William Moore, sub-prior, was presented with his confreres to the bishop, September 27, and nominated by him October 2, 1518. He resigned the priorship at the beginning of the year 1536, and had the manors of Crowle and Grimley assigned to him."

Dugdale (from Leland's "Itinerary") quotes, "Placis belonginge to the Prior.

Batnal, a mile out of Worcestar, with a parke and pooles.

Gryley, a three miles above Worcestar prope Severn, agayne Ombresley, in ripâ dextrâ Sabrinae.

Halow, a park withowt a howse a two miles from Worcestar.

Croule, a four myls from Worcestar.

More prope Tende, a ten myles from Worcestar prope fines Herefordshire."

Items.

"Leaf 33.—Item, payd to thomas peynter for peyntyng the bordures in the lyttul parlour withyn the lyttul haule . . . . . v s. iiij d.

Leaf 34.—Item, payd to wurkemen wurkyng at the dey poole at batnall . . . . . ii s. ij d.

Leaf 34.—Item, payd for paynes of seyntes, with steyned clothes, pawpers, & cetera, for the hangyng of chamberes . . . . . xj s.

Leaf 35.—Item, for ij turned stoles . . viij d.

Leaf 35.—Item, for lynnen clothe for bordures to peynt for the hall at grymley.

Leaf 36.—Item, for A Ax, a hatchet, pynsons & cetera . . . . . xvj d.

Leaf 36.—Item, payd to John berow for carage to the mere at grymley for the leyng of the trowh . . . . . xvj d.

Leaf 36.—Item, to John churche for makyng of a trowh to the water coorses at bale broke . . . . . iij d. viij d.

Leaf 43.—Item, payd to thomas Stilgo for gyldyng & peyntyng of the ymages of & Jhesus our lady in the myddes of the awter in seynt Cecilis chappell . . . . . xxviii s. iiij d.

Leaf 43.—Item, the gyldyng of al the other ymages with the curtens. . . . . x li. vj s.

Leaf 45.—Item, the new clansyng of Whitnell poole at grymley besydes mete & dryncke & the warke of my nown seruauntes. . xxxiiij s. viij d.

Leaf 45.—Item, xx^{ti} c. of pale, & the palyng therof, at hallow parke cost . . ciij s. iij d.

Leaf 45.—Item, the new makyng of the flud yeate at Whitnell poole, without mete & drynke xix s. x d.

Leaf 46.—Item, to John fullis, carpynter, & iij with hym, abowte my fatheres hows at grymley . . . . . iij s. ix d.

Leaf 46.—Item, to thomas sovern for a quarter of wyndyng roddes to my fatheres hows. . xviij d.

Leaf 48.—Item, payd for hynges & hookes & nayles, ... x s.

Leaf 48.—Item, to Richard Stawnton for thatchyng of parte of the same hows . . . . . vj d.

Leaf 48.—Item, to certen tenauntes for carage of thornes, stakes, to Whitnel parke . xiiij. d. x d.

Leaf 48.—Item, to John Berowe for carage of cley, sond, and bryckes to my fathures warke. ij s. x d.

Leaf 48.—Item, to ij Sawyares for the same warke at grymley . . . . . xv d.

Leaf 48.—Item, to William poole & a nothur mason for makyng of the chymney of the same warke. . . . . xviij d.

Leaf 48.—Item, to Richard smyth for lokes with keys, catches for durres, with al other yerne warke to the seyd hows . . . . . x s.

Leaf 48.—Item, to A dawber for warke at the seyd hows* . . . . . viij d.

Leaf 49.—Item, to Thomas kynges, peynter, for peyntyng of the seyd bordures, iij d. a yearde xj s.

Leaf 51.—Item payd for brycke, lyme, & sonde, to the reparacion of the Anckras hows by the charnel hows, ex deuocione . . . . . x s.

Leaf 56.—Item, payd for the new schowryng & reparng of the Alabastur tabull to the hye Awter of grymley churche . . . . . iiij s. vj d.

Leaf 58.—Item, for a m^{l} of bryckes to mastur brewton, of gyft to his chymney at Nethurton. v s.

Leaf 70.—Item, payd to thomas kynges for peyntyng of the borderes of my chamber & the deysse at crowle conteynyng xl^{ti}vj yeardes, prece of euery yearde ij d. . . . . Summa vij s. viij d.

Leaf 70.—Item, to Robert penrysse, kervar, for the makyng of our lady & seynt John the euaungelist, ix s. apeece. Summa of the hoole, iij li. v s.

Leaf 75.—Item, payd to Edmund glasyar, of Alcetur, for glasyng the lower wyndowe with mary & John in the chappell at crowle conteynyng ix footes & halff prece† . . . . . iiij s. xij d.

Leaf 82.—Item, to A man for drawyng of a platt for A stonne from London that is leyde before Jhesu's awter for me to be beride vndur, whiche stone cost x li. to a man of london besydes the carage: & the makyng of the platt iiij s. iiij d.

Leaf 85.—Item, to the seyd glasier [cornesshe colfull] for glasyng of the wyndow in the seyd chambur, on the yest parte to the lordes garden, conteynyng xxx^{ti}j footes: of that ther is v skocions & vij Rowndes abated; the price of euery skochion, viij d.; the price of euery rounde, vj d.; the price of euery foote of white glasse, v d. conteynyg xx^{ti}iiij foote: the v skochions & vij Rowndes conteyneth vij foote. Summa of the hoole is xvj s. x d.

Leaf 103.—Item, payd for c footes of glasse in quarrelles bowht at London, ij d. ob, the foote, prece . . . . . xx s. x d.

Leaf 104.—Item, bought at london the peynted clothes that hangyth in the lowe newe parlour next the chappell at batnall, conteynyng in lenght xx^{ti}iiij yeardes & ij yeardes ij quarteres depe, at v d. ob. the yearde, lxvj yeardes of folery workes with dyuers beestes & fulles . . . xxx s. iij d.

Leaf 105.—Item, for xij skochions of my Armes to A glaseare of Abbottes Bromley . viij s. iij d.

Leaf 114.—Item, for a framyng sawe . xx d.

Leaf 114.—Item, for dressyng of my clocke, to A Smythe, of glowcetur . . . . . ij s. iiij d.

Leaf 117.—Item, to thomas walsall & frances chamburlen for fallinge of trees for makyng pales . . . . . xxij d.

Leaf 117.—Item, to thomas walsall & frances chamburlen for sawyng for pales at hallowe parke . . . . . xiij d.

Leaf 117.—Item, to thomas walsall & fraunces chamburlen for clyving of pales for hallowe parke . . . . . xvj d.

Leaf 118.—Item, to thomas walsall & chamburlen for palyng at hallowe parke . . . xiiij d.

Leaf 127.—Item, to mastur . . . barnes for peyntyng of the story on the chaptur hows dure . . . . . xiij s. iiij d.

Leaf 127.—Item, paid for xi c of pales for the paling of halowe parke, with the carage xlvij s. ij d.

Leaf 127.—Item, paid for xv rayles to the paling . . . . . xviij d.

Leaf 131.—Item, to thomas walsall & John wyrrall, wurkyng at hallowe parke, in reparacion of palying. ij s. xj d.

Leaf 133.—Item, to iij warkemen for cropping & clyffyng of wood at hallowe parke . . v s. vij d.

Leaf 133.—Item, paid for v c pales at bewdeley. xx d.

Leaf 133.—Item, for a c of pales & a half. vj s. v d.

Leaf 133.—Item, for a c of pale . iiij s. iiij d.

Leaf 135.—Item, to ij warkemen for wurkyng to make the heed of the heed at crowle mott . vj d.

Leaf 135.—Item, to laborares abowte the makyng of the heed stancke* at the mott at crowle . viij d.

Leaf 137.—Item, to thomas childe for carying of Rayles from monckewood to batnall parke. ij s. j d.

Leaf 137.—Item, for carage of an awter stone for crowle chappell from ombursley† . . . . xx d.

Leaf 137.—Item I sett to taske warke to John Gysse & Nicholas Symondes . . . crowle, the full makyng of the on syde of the motte, on the . . st syde, by the pygion howsse, to be Above xij footes in the . . . . , & xxx^{ti}ij foote in the ouer parte, and they to haue in the hoole . . . said warke, iij li. xvj s. viij d. paid ther-of, iij s. iiij d. xl s, x s. viij d. xiij s. Summa, xiij s. iiij d.‡

Leaf 138.—Item, I sett to taske warke, the fynneshyng of the hoole warke of the mott at Crowle on the North syde, to Anselme the baker, thomas haye of crowle, conteynyng xij footes & more in the bootum, & xxxij footes Above at the ouer bryme & more; & he to haue for his labur xxvj s. viij d. paid ther-of . . . . . xiij s. xij s. viij d.

Leaf 146.—Item, payd to warkemen for the makyng of A newe well in the hye wey, in the hyther, or sowthe yend of grymley towne, to serue the iij housoldes at that yend of the towne by Richard peres howsse, whiche well was made by me, William more, priur of wurcetur, this wycke, where was never well there before . . . iij s. vj d.

Leaf 154.—Item, to warkemen for mendyng the fludyeates at grymley pooles . . . . —

Leaf 156.—Item, to dyuers at grymley, for

* The next item, evidently immediately after the completion of the father's house, refers to the expense of his burial at Grymley.

† Several entries give v d. a foot for white glass.

* Stanc, sb., O. Fr. estanc; pool, tank, reservoir.—*Stratmann.*

† We know the approximate weight of the burden, the mensa or top slab of the altar, the distance would be about seven miles.

‡ The Prior's arithmetic is not to be relied on.

getheryng of * peopull stones in the fyldes of grymley for the makyng of more brugge And monckewoodes yeat . . . . . vj s. viij d. xviij d.

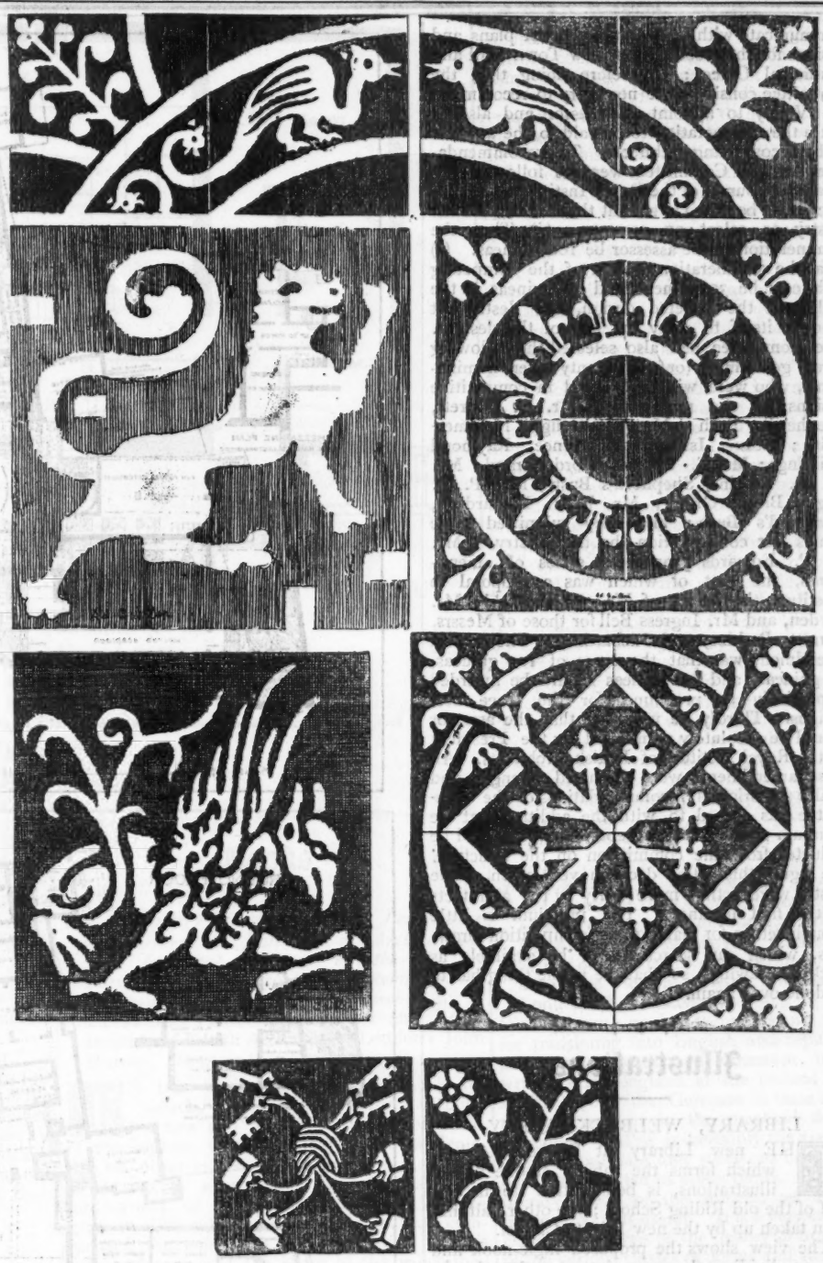
TRIER'S DOUBLE-ACTION STONE-DRESSING MACHINE.

MESSRS. BRUNTON & TRIER have recently brought out a new type of double-action stone-dressing machine, which is worthy of attention. The firm has produced several machines of a similar nature, but this they state is an improvement on all that have preceded it. Its leading characteristic is that it dresses two adjacent surfaces at one time, producing a perfectly sharp arris where the surfaces meet. The tool marks are also at right angles to the length of the stone and their number can be varied at will. Our illustration on the present page is a perspective view of the machine. The stone to be worked is attached to the table marked T in the illustration. This table is traversed by means of worm gearing placed beneath it, as shown at W in the illustration. Arrangements are made for running one table off the bed on to rollers, so that another can be substituted for it. In this way the stone to be dressed can be changed without the machine being thrown out of work whilst setting is being done. Revolving circular cutters are used, as shown at X and Y. The right-hand standard A is provided with vertical guides as shown. Upon this moves a compound slide rest having a vertical motion, which is imparted by a connecting rod, E, which is attached to the disc crank, F. This mechanism operates on the vertical sides. For the top or horizontal surfaces a tool-box is provided on the bridge or cross-beam marked C.

On this there are guides in which moves a compound slide-rest marked G; the direction being naturally horizontal. The connecting rod, I, is actuated by another crank, H. Spur wheels, K K, partly shown at the back of the crank discs, F H, by means of a pinion impart motion to both cranks, and to their respective slide cutters, by means of a belt, and fast and loose pulleys, L, on the pinion shaft. The motion is so timed that the cutters, although reciprocating together, and dressing the top and side surfaces of the stone at the same time do not strike each other. As will be seen, the length of stroke of the cutters can be altered by shifting the crank-pins in the slots in their discs. The cutters can be set to the required depth, and they act by the wedge action of their rolling sharp edges. In order to "step-cut," which involves acting on the stone at two different levels, during alternate strokes of the cutters, an arrangement is adopted by means of which the operation is performed automatically. Rods M and N which pass through slots in the brackets O P, are fitted with adjustable stops, and actuate a swivelling arrangement in the tool-holders at the end of each stroke. In this way it is arranged that when the cutter travels in one direction a deep roughing cut is taken; whilst on the return stroke the cut is a lighter finishing one The stone is fed or moved forward at the end of each stroke when the cutters are off the stone. The amount of feed of the table is adjustable and determines the space between the tool marks. The speed of operation naturally differs with various stones and the class of work required; the makers give as an average the following rates of working:—On hard granite the advance averages 1 in. per minute, and on hard sandstone it can be increased to 4 in. per minute, giving an output on a stone 1 ft. by 2 ft. by 5 ft. of about 4 superficial feet of granite, and 15 superficial feet of sandstone in fifteen minutes. This does not take account of the time of changing stones, cutters, &c. With regard to the output per day, that naturally depends on the rapidity with which stones are fixed on the the tables and the condition of the surfaces to be operated upon. The stones should be quarry-scabled, and then cuts ¾ in. to 1 in. in depth will leave good surfaces. The wear of cutters is said to be very small; the tool cost being considerably less than that attendant on hand-labour. With most kinds of stone a smith is not required, the sharpening of the cutters being accomplished by grinding only. The power taken to drive the machines is also said to be very moderate, varying between 3 to 6 h.-p. Messrs. Brunton & Trier make three sizes of these machines, to dress blocks of the following dimensions:—(1) 12 in. by 18 in. by 9 ft.; (2) 24 in. by 36 in. by 9 ft.; (3) 36 in. by 48 in. by 12 ft. There is no reason, however, why larger sizes should not be made. The machine can also be used for turning columns by swinging them between centres fixed on the table and providing a simple means of rotating them. Amongst other purposes similar machines have been used for working the granite for the Tower Bridge, where they are stated to have given great satisfaction, both in surfacing on the flat and for turning and moulded work. The new machine illustrated above has been used upon the hard grit-stone of the new post-office at Leeds with great success.

THE BRITISH INSTITUTE OF PUBLIC HEALTH.—We are asked to mention that the next examination for the Certificate of Proficiency for Sanitary Inspectors will take place on October 27 and 28. Candidates must send in their names before October 19.

* We may, perhaps, read this *of* as *by*, but the MS. distinctly gives *of*.



Some French Mediæval Tiles.

EXAMPLES OF FRENCH MEDIÆVAL TILES.

THESE tiles are from a considerable collection of drawings of French Mediæval tiles which have been made by M. Adolphe Guillon, a French landscape painter who is well known for his interest in archæology and ancient monuments. M. Guillon has published a small book on the subject, giving the results of his studies with a number of illustrations.

THE CLUB AND INSTITUTE UNION.—In the presence of a numerous company of working men, Lord Brassey, who was accompanied by Lady Brassey, last week performed the ceremony of opening the new buildings of the Working Men's Club and Institute Union, which are situated in the Clerkenwell-road, Holborn. Mr. Hodgson Pratt presided. Lord Brassey said it was the boast of the men who formed the Union that they were working the movement by their own labour, and by the hold of that marvellous power of organisation which was so distinctive and notable a characteristic of the Anglo-Saxon race. One of the things which all men were anxious for was the multiplication of opportunities for bringing all classes of the people together. When the men of the Union secured an eight-hours' day they would be in a better position to enjoy the advantages which the building offered for recreation and instruction. On the motion of Mr. S. Taylor, a vote of thanks to Lord and Lady Brassey was carried amid cheers. The total cost of the premises was 20,000*l.*

COMPETITIONS.

UNION CHURCH, CLYDEBANK, N.B.—Owing to the present church of the Clydebank Union Congregation having been acquired by the railway company for the extension of the line, the erection of a new church upon an adjoining site was decided upon, and a competition invited for the purpose of selecting plans. Designs were requested from seven of the leading Glasgow architects, with Mr. Hippolyte J. Blanc, A.R.S.A., as assessor, and, in accordance with his award, the work has been placed in the hands of Mr. John B. Wilson, A.R.I.B.A., Glasgow; a second premium of 20*l.* awarded to Mr. J. Miller, and a third of 10*l.* to Mr. Wm. Rowan, both of Glasgow. Mr. Blanc, in his report upon the selected design, states:—"Design No. 5 is the only one whose cost is confirmed by the measurer's calculations at 5,500*l.*, and of all the designs submitted it is the most satisfactory on all points. The plan makes ample provision for the respective requirements, and the external design is complete. It expresses much individuality and refinement, and would, in my opinion, prove in every respect a most satisfactory edifice. I therefore recommend its adoption." The work is to be commenced as early as possible, with a view to completion in course of next summer.

HAMMERSMITH MUNICIPAL OFFICES.—At a meeting of the Hammersmith Vestry, held on Wednesday evening, a long discussion took place upon a series of recommendations by the Town Hall Committee, who had been instructed to

communicate with seven architects for plans and designs for the erection of a new Town Hall and Municipal Offices; but before doing this, the committee considered it necessary to recommend the Vestry to appoint an assessor, and also to settle the remuneration to be paid to the assessor and the competing architects. The recommendations of the Committee were as follows:—(*a*) That the Council of the Royal Institute of British Architects be asked to submit three names for the Vestry to select an assessor. (*b*) That the remuneration to the assessor be 100 guineas. (*c*) That the remuneration to each of the competing architects be 30 guineas, and 50 guineas to the author of the selected design, the Vestry not binding itself to carry out any of the designs. The Committee had also selected the following seven gentlemen (out of twenty-seven nominations), who were willing to send in competitive designs for the new Hall:—Mr. T. Garrett, Shepherd's Bush; Mr. H. Gough, Hammersmith; Messrs. Isaacs & Florence, Raymond Buildings; Mr. E. W. Mountford, Strand; Mr. W. G. Perkins, Shepherd's Bush; Mr. P. P. Pugin, Brook Green; Mr. J. H. Richardson, Shepherd's Bush; and they submitted these names for consideration by the Vestry. Mr. R. P. Edwards proposed a series of amendments, the first of which was a proposal to substitute the names of Mr. Aston Webb, Mr. Bryden, and Mr. Ingress Bell for those of Messrs. Garrett, Perkins, and Richardson. The second amendment was that the sums of 100 guineas, 60 guineas, and 40 guineas should be awarded respectively as premiums for the three best designs. Thirdly he proposed that the assessor should be absolutely nominated by the President of the Royal Institute of British Architects. All these amendments were discussed at length, and finally the original recommendations of the Committee was agreed to, with the addition that the premium paid for the accepted design should be deducted from the commission on the structure. We regret this latter decision very much. The Vestry were acting more fairly by the architects in the first instance. The premium is little enough return for making the competition drawings, which can scarcely ever be available as working drawings, so that the whole thing has to be done over again.

Illustrations.

LIBRARY, WELBECK ABBEY.

THE new Library at Welbeck Abbey, which forms the subject of one of our illustrations, is being fitted up in one half of the old Riding School; the other half has been taken up by the new Private Chapel.

The view shows the proposed ingle-nook and screens dividing the room into two lengths for greater convenience of use.

The work will be in alabaster, with ebony screens, veneered with ivory and pearl, and decorated with work in coloured gesso. The fireplace of alabaster, with pearl inlay, is being made by Mr. F. W. Pomeroy.

The ceiling will be of modelled plaster, and the whole room will be panelled. At the end next the Chapel is the organ gallery, for an organ which is arranged to play into both the Chapel and the Library, and will have in addition an echo organ in the Chapel.

Mr. H. Wilson is the architect. The drawing from which the illustration is taken was hung in the last Royal Academy Exhibition.

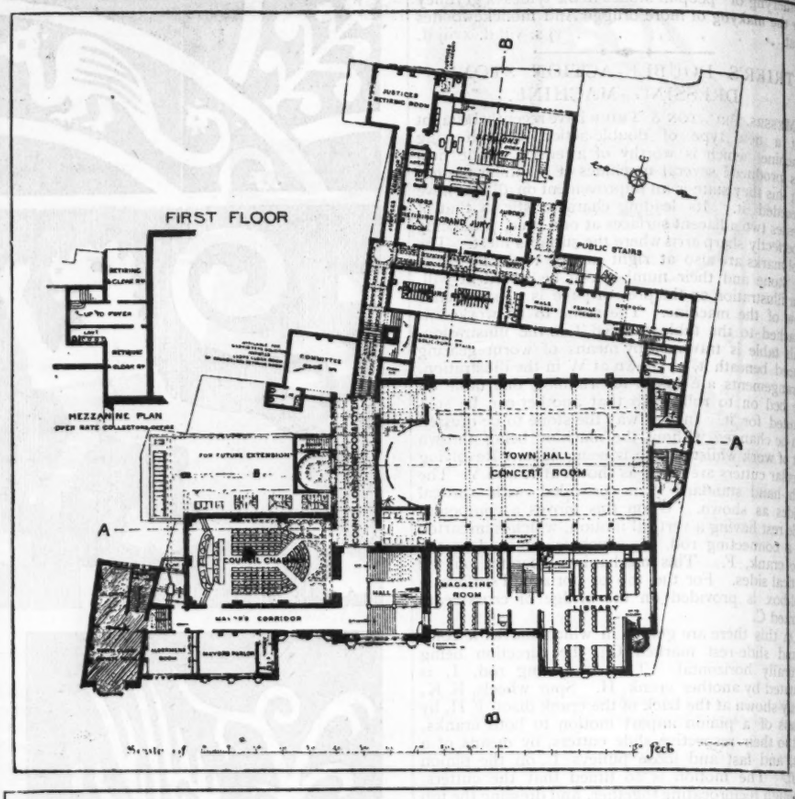
OXFORD MUNICIPAL BUILDINGS.

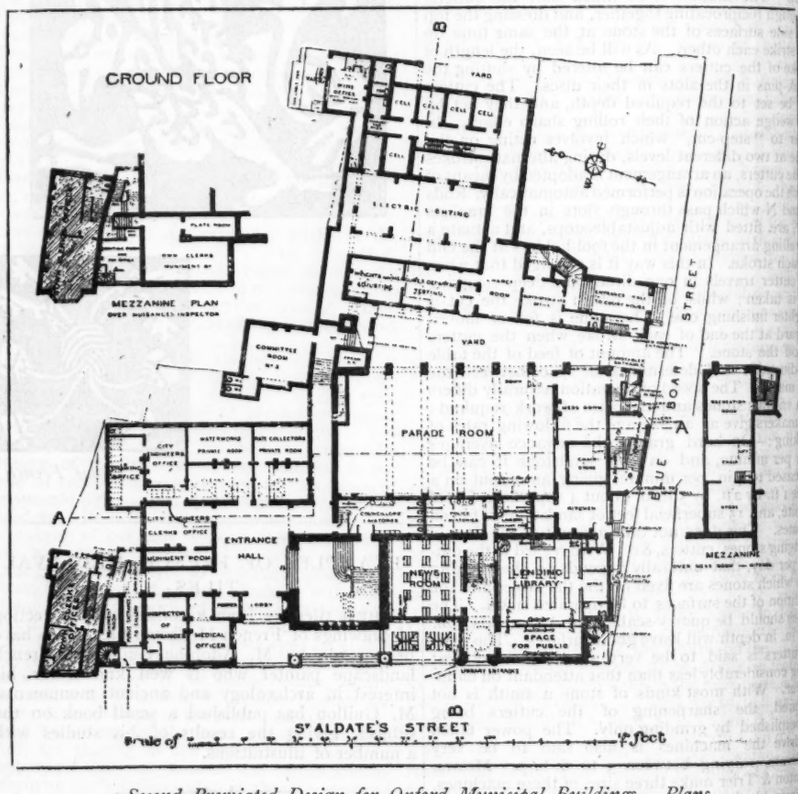
THIS design was placed second in the final competition. The assessor in his report considered "the general idea of the architectural treatment was decidedly superior to" the accepted design, but the detail was not considered by him so satisfactory.

The materials proposed to be used were:—Monks Park and Box-ground Bath stone for external walling; the roofs to be covered with Westmoreland green slates.

A feature in the design was the setting back of the central portion, which was rendered desirable on account of the narrowness of St. Aldate's-street.

Particular attention was given to the disposition of the windows and openings in the rear of the building, in view of the probability of other buildings being erected on the rear boundaries; and it will be seen that the plan has been greatly governed by the important element of lighting.





Second Premiated Design for Oxford Municipal Buildings.—Plans.

We may add that the original water-colour drawing, an exceptionally good one (as we observed in reviewing the architectural drawings at the Royal Academy), is by the architect's own hand.

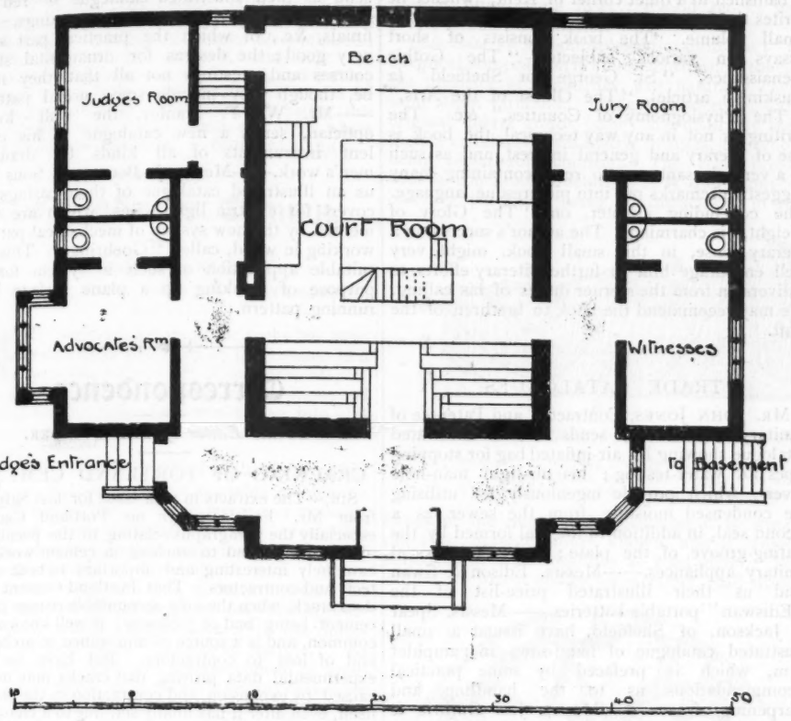
SCULPTURE FROM THE ROYAL ACADEMY EXHIBITION.

"MYSTERIARCH."

THE bust thus entitled, the work of Mr. G. Frampton, occupied a central position on the south wall of the lecture-room at this year's Royal Academy Exhibition, where it attracted a good deal of attention. It is an attempt to express in the head and in the accessories the idea of one who presides over mystery, a kind of priestess such as might have given out the oracular message at Dodona. The face is dreamy and self-contained in expression, the wings and the drooping hair in which the head is framed serving to increase the effect of mystery, the expression of something weird and inexplicable. The mask and the bat-wings on the bust subserve the same effect. The head is relieved in front of a surface partially gilt, and broken up into curling lines of slight relief, which forms a kind of nimbus behind the head, the broken up surface preventing the effect from being too hard and pronounced, while it symbolises the smoke which always accompanied the utterances of the oracle. The architectural accessories are well treated, and the work altogether is one of unusual interest, both in idea and design. It is executed in marble.

MEMORIAL TABLET.

The memorial tablet to Dr. Wooldridge, of



The Peel Court House, Isle of Man.—Plan.

which we give an illustration, is the work of Mr. E. Roscoe Mullins, and was exhibited at the Royal Academy of this year. The sculptor was left entirely free to adopt his own treatment, and the result is a design which is remarkably decorative in its lines, and fills the circular space in a natural and unforced manner.

The tablet is executed in bronze, and has now been placed in the vestibule of the museum of Guy's Hospital.

BUST: "WITH MODEST EYES DOWNCAST."

The above words formed the only title to this bust in the Royal Academy catalogue. It is the work of Mr. Andrea C. Lucchesi, who intended it as illustrative of modesty; the costume is Puritan, in order to harmonise with the idea of the work. It is executed in marble, and was one of the most pleasing and interesting of the busts in the Exhibition.

COURT HOUSE, PEEL, ISLE OF MAN.

THIS Court-house, which has lately been completed, is faced with red bricks and pink terra-cotta, from the works of Mr. J. C. Edwards, of Ruabon. Small green slates, from the Llwydcoed quarry, Penygroes, have been used for the roofs. In the basement are arranged two cells, and an officers' room as well as a heating chamber and coal-cellar.

The builders were Messrs. McAdam & Moore, of Douglas. Mr. Langton Dennis was the architect.

"THE GROVE," HARROGATE.

THIS, as will be seen by the plan, is a collection of cottages built round three sides of a quadrangle, the open end of the quadrangle facing the entrance-gates of the client for whom the cottages were built.

The materials used are local sandstone, timber, and red tiles.

The architect is Mr. T. Butler Wilson.

"COURTYARD OF HOUSE AND STUDIO."—Mr. Howard Ince, the architect of this house, which we illustrated last week, wishes us to add that the house is No. 16, Maida Vale, and has been built for Mr. Alfred Gilbert, R.A.

THE THREATENED LOCK-OUT AT CARDIFF.—The master builders of Cardiff, who had threatened to lock-out the union masons in their employ owing to the refusal of the men to work with non-society men, have come to terms with their *employés*, and work has been resumed, the non-society men joining the union.

Books.

The Chronology of Mediæval and Renaissance Architecture: a Date-book of Architectural Art, from the building of the Ancient Basilica of St. Peter's at Rome to the Consecration of the present Church. By J. TAVERNOR PERRY, Member of the Royal Institute of British Architects. London: John Murray. 1893.

IN this book, the result of much research, Mr. Tavernor Perry has done a new and most useful piece of work, of the highest value to architectural students. As he observes, no writer has yet attempted to present in sequent and chronological order an account of works simultaneously in progress in different countries. The author commenced the compiling of these tables for his own purposes, and the sense of the value they have had for himself has induced him to make them available for the use of others. Architectural students owe him their best thanks for undertaking a tedious and laborious piece of work, the result of which, however useful, is not of that kind which brings with it popular success with general readers. The number of those who will use and appreciate such a book is necessarily limited; but it is a publication which appeals especially to the most serious and thoughtful class of architectural students.

The book opens with a short synoptical table of the leading buildings in Europe erected during certain divisions of historical time. Then follows the serious business of the book, in the shape of architectural events arranged in chronological order, as nearly as possible year after year. In the early part of the chronology we have, naturally, gaps of several years between the buildings that can be dated and recorded; as we come nearer to the Mediæval period, when there is more information available, the dates become closer, and after the year 1000 we proceed by consecutive years, the lists for each year gradually increasing in length, down to the year 1626, which closes with "St. Peter dedicated by Urban VIII., November 18th."

The second part of the book consists of an alphabetical index to the places and buildings mentioned in Part I., the dates of the years under which each has been mentioned being appended to the name of the building. A third part gives an alphabetical list of the names of architects, sculptors, and other persons referred to in Part I., dated in the same manner as the buildings in Part II. The volume is concluded with a fourth part, giving an alphabetical list of the principal authorities quoted in the book, which is in itself a kind of concise guide to the literature of architecture.

In the concluding paragraph of his preface the author observes that no doubt much remains to be discovered from unpublished inscriptions remaining on the buildings themselves. Beyond this, until the British Museum contains all the local histories published, and until these have been thoroughly examined, a great deal of information must remain to be acquired, and a work of this character must still be incomplete; "but the author has considered it better to issue these tables at once, whatever their omissions or imperfections may be, rather than indefinitely to wait for an almost impossible completeness." Mr. Perry is quite right. Life is short, and in a work of this kind, in regard to which there must be always something new to be learned, it would have been quite a mistake to hold back the large amount of information which he has already put together, in the expectation of eventually gaining more and reaching a point from which there would still be a vista in advance, of possible further information.

As we have implied, such a book cannot be regarded as a work of literary interest in the ordinary sense of the word; its real interest depends very much on the mind of the student who comes to it, and on his perception of its practical value in aiding our historic conception of architecture. On the other hand, the book enjoys the fortunate position of being one to which criticism can hardly be applied. In clear and systematic arrangement it seems to be as well done as it possibly could be; it is a kind of work for which one can offer nothing but thanks and commendation, and which must henceforth be a necessary appendage to every architectural library. We hope it will receive that practical recognition from every student and professor of architecture which the author will probably feel to be the best reward he can have for his painstaking and intelligent labour.

A Handbook of Ornament, Systematically Arranged, for the Use of Architects, Decorators, Handicraftsmen, and all Classes of Art Students. By FRANZ SALES MEYER, Professor at the School of Industrial Art, Carlsrühe. Translated from the fourth revised German edition. London: B. T. Batsford. 1893.

WE are quite unable to understand the motive for translating into English and republishing in this country works on ornament by German writers. In England at the present day we are so far beyond the Germans in taste and perception, as well as in the practical designing of ornament, that it is certainly the Germans who ought to translate and study our books instead of our being invited to study theirs. For the mere literary study of the subject, no doubt, Herr Meyer's book is useful. It is a very extended and elaborate analysis of the history of ornament, and of the various classes of forms and subjects which have been used ornamentally at various periods, and the author sets out rightly in making the study of geometrical forms and arrangements the basis of the study of ornament. All this, however, is admirably put in Mr. Day's series of books on ornament, and Owen Jones's monumental work; we do not require to go to Germany to learn it. And in this, as in other German books we have seen, whatever is valuable in the text is more than compensated by the bad character of the illustrations, which can have no effect but to vitiate the taste of the beginner, while the ornamental designer who knows anything of his art as it is understood in England will only regard them with contempt. The greater proportion of the examples given are in the poorest taste; many of them have no claim to be called ornament at all, and even those which are good in themselves are spoiled by the hard, wiry, inartistic style of drawing employed. Of the German ornamentist it might be said, in a kind of dog-Latin variation of a well-worn saying, *nihil tetigit quod non spoliavit.* The Renaissance ornament is the best drawn, and even that has all the delicacy and spirit taken out of it; the Gothic ornament is reduced to Batty Langley-ism, and the characteristic Greek forms of ornament seem to have lost their proper flow and look as if they were done in cast-iron.

The student may find this useful as a book of reference for styles and history, but the less he looks at the illustrations the better—and surely exactly the contrary ought to be the case with a book on ornament that is to be worth anything. The text ought to teach him the right principle of treatment, but the illustrations should be a still better instruction, as in the best English books they are, and as they are not in this or any

modern German book of the kind that we have seen. Then why go out of the way to introduce them to English readers who have better guides at their own doors?

Sefton: a Descriptive and Historical Account. By W. D. CARÖE, M.A., F.R.I.B.A., and E. J. A. GORDON. London: Longmans & Co. 1893.

THIS is a handsome and well-illustrated book of the local history of Sefton or Sephton (the latter the old spelling) near Liverpool, embodying the collected notes and researches of the late Rev. Engelbert Horley, a member of the Historic Society of Lancashire and Cheshire. The church of Sefton, though not very striking in its exterior, is a very interesting one, and contains effigies, brasses and carved woodwork of which illustrations are given; and the neighbourhood appears to furnish a good many quaint and picturesque bits of old building. We presume the illustrations are by Mr. Caröe.

It appears that Sefton church is still unrestored, and the authors express a hope, in which we coincide, that it may be left as a rare example of an unrestored Mediæval church, except so far as the removal of some inconvenient additions made in the churchwarden era may be desirable. As far as the stability of the fabric is concerned we are assured that Sefton church is in a perfectly safe and satisfactory condition.

The interest of the book is to a great extent local, but it is a very well got-up volume of its class, and may as such deserve a place in the libraries of archæologists beyond the limits of the locality of which it treats.

Les Artistes Célèbres. Les Moreau. Par ADRIEN MOUREAU. *Les Cochin.* Par S. ROCHEBLAVE. Paris: Pierson et Cie.

HOW many readers in this country know anything of "Les Moreau?" We confess that the name was new to us. The two Moreaus, brothers, were painters of the latter half of the last century, living just into the present one; the elder, Louis Moreau, a landscape painter, the younger, known as Moreau le Jeune, a figure-painter chiefly of society scenes, and by far the more important artist of the two; many of his groups and studies of single figures are charming in a certain conventional and affected manner of the period; the studies of costume figures (except in a tendency to make the heads too small, which is sometimes carried to an absurd excess), show admirable drawing and keen observation of manner and character. Moreau was employed, or employed himself, not unfrequently in commemorating important scenes in connexion with the French monarchy; among others we have in this volume the reproduction of his representation of the illuminations at Versailles on the occasion of the marriage of Louis XVI., the opening of the States General at Versailles in 1789, &c. Many of his pictures have great interest as illustrations of the manner and dress of the society of his period. He made illustrations to the works of Rousseau and Voltaire, and one of the best designs given in the book is "Le Premier Baiser d'Amour," made as an illustration to Rousseau's "Nouvelle Héloïse." The numerous sketches and studies which illustrate the volume are taken from the large collection of original drawings by Moreau in the Louvre.

"Les Cochin" were a duet of artists who take a place very analogous to that occupied by the Moreaus. In this case as in the former, it is the junior of the name who is the more important and gifted artist, but with the Cochins the relationship was not that of elder and younger brother, but of father and son. Cochin *père* was an engraver, and eventually engraved some of his more gifted son's works. Cochin *fils*, who lived during the same period nearly as Moreau le Jeune, is somewhat similar to the latter in the nature of his work. He also produced prettily grouped and graceful illustrations of contemporary society, designed ornamental plates and borders, and painted representations of important functions at Versailles. He was also a noted portrait-painter, and engravings of many of his portraits are given here as illustrations. Cochin's studies of figures and groups of an imaginary kind are very numerous and varied, and in some respects superior to Moreau's; the style is more elevated. Both these books afford very interesting record and illustration of the works of some artists little known in England.

An Architect in Exile; and other Essays. By BERNARD WHELAN. London: Burns & Oates. New York, Cincinnati, Chicago: Benziger Brothers.

THE Architect in Exile describes himself as "banished to a quiet corner of Kent," whence he writes the first essay which gives the title to his small volume. The book consists of short essays on various subjects—"The Gothic Renaissance," "St. George for Sheffield" (a Ruskinian article), "The Oldest of the Arts," "The Physiognomy of Counties," &c. The writing is not in any way technical, the book is one of literary and general interest, and as such is a very pleasant one to read, containing many suggestive remarks put into picturesque language. The concluding chapter, on "The Glory of Height," is charming. The author's success, in a literary sense, in this small book, might very well encourage him to further literary efforts, as a diversion from the sterner duties of his calling. We may recommend the book to brethren of the craft.

TRADE CATALOGUES.

MR. JOHN JONES, Contractor and Patentee of Sanitary Specialties, sends us an illustrated catalogue showing his air-inflated bag for stopping pipes for water-testing; his air-tight man-hole covers, which provide ingeniously for utilising the condensed moisture from the sewer as a second seal, in addition to the seal formed by the seating-groove of the plate; and other special sanitary appliances.——Messrs. Edison & Swan send us their illustrated price-list of the "Ediswan" portable batteries.——Messrs. Spear & Jackson, of Sheffield, have issued a small illustrated catalogue of hand-saws in pamphlet form, which is prefaced by some practical recommendations as to the handling and sharpening of saws.——Messrs. Jas. Guthrie & Co. send a largely illustrated catalogue of lamps, gas fittings of all kinds, also gas stoves, &c.——Messrs. Roberts, Adlard, & Co. send a catalogue of ornamental slating and ridging, with some explanations as to the best means of setting and arranging slates for the formation of patterns or inscriptions. The latter, of course, are only of use to tradesmen; and architects do not much favour pattern-slating now; but it is convenient that those who want it should have the requisite practical information before them in regard to this class of work.——Messrs. G. B. Kent & Sons send us their illustrated catalogue of brushes, both for house-painter's and artist's work.——Messrs. W. Pryor & Co. send a very voluminous catalogue, including plumber's fittings, grates, kitcheners, mantelpieces, ornamental railing, &c. The ornamental work is no better than it usually is in such catalogues—the chimney-pieces rather worse than usual; but the practical fittings seem very good, and the prices low.——Messrs. Twyford's very-well-got-up catalogue illustrates a great many excellent articles made by the Cliff Vale Pottery Company: the "Deluge" and "Deluge Adamant" (extra strong) type of closets appear admirable; the "National" and "Alliance" side and front outlet closets are not good, because the depth of water in the pan is far too small, and if there are 100,000 in use we regret to learn it. There is rather too much display of ornamental work in the drawings of some of the closets and lavatories; it may be doubted whether this is an advantage even commercially; most sensible people nowadays prefer simple, well-made work to stock ornament.——Messrs. William Sugg & Co. send us their catalogue of patent ventilators, ventilating gaslights, &c., many of which have excellent practical qualities; it is a pity that the makers of these kind of things will try to produce what they call "ornamental" designs, such as those on pages 4 and 5. They can never recommend a catalogue to architects by such designs.——Messrs. Hartley & Sugden's catalogue of wrought iron and steel welded and riveted boilers is a useful and fully illustrated catalogue of practical work.—— The Ashton & Green Iron Company send us an ample catalogue of fireplaces, enamelled slate goods, sanitary appliances, &c.——Messrs. Adams & Co. send a revised edition of their catalogue of sanitary appliances, in which large flushing-tanks form a special feature. The work and the illustrations are mostly excellent; we may observe, however, that a larger proportion of sectional drawings, instead of mere outside delineations, would make the catalogue more generally useful to architects, who want (or ought to want) to see exactly how a thing works, not how it looks. We may also observe that their turn-over inner rim for bath, which, as they say, prevents splashing, is a contrivance which was patented by the editor of this journal, and illustrated in these columns, some years ago: the patent, however, was allowed to lapse.——Messrs. Wood & Ivery send us their illustrated catalogue of red and blue brick pavings, curbs, crestings, and finials, &c., of which the practical part seems very good; the designs for ornamental string-courses and crestings not all that they might be, though they include some useful patterns. ——Mr. W. F. Stanley, the well-known optician, sends a new catalogue of his excellent instruments of all kinds for draughtsmen's work.——Messrs. J. Bennett & Sons send us an illustrated catalogue of their casings and covers for electric light wires, which are ornamented by the new system of mechanical pattern-working in wood, called "Goehring." This is a suitable application of such a system for the purpose of breaking up a plane surface by a running pattern.

Correspondence.

To the Editor of THE BUILDER.

CRACKING OF PORTLAND CEMENT.

SIR,—The extracts in your issue for last Saturday from Mr. Faija's paper on Portland Cement, especially the paragraphs relating to the peculiarity of "blowing" and to cracking in cement work, are extremely interesting and important to both architects and contractors. That Portland Cement work does crack, when the only accountable reason is, the cement being bad or "blowey" is well known and common, and is a source of annoyance to architects and of loss to contractors. But have we any experimental data proving that cracks may not be caused by expansion and contraction in the cement itself, even after it has finally set, due to a change of temperature?

For instance, the floor or walls of a bakehouse, exposed at times to great heat, or external rough casting, exposed to the sun's rays at certain seasons. I have a case or two in my mind in which cracks in the finished work could only be attributed to the cement being bad (of which there was no evidence, but rather the contrary), or that expansion and contraction, due to variation in temperature, was taking place in the material itself. This latter theory was strengthened because the cracks were more apparent at certain times than others.

J. H. MARTINDALE.

RE "LEICESTER STORM OUTFALLS."

SIR,—In your number of the 9th inst. you give a short description of the Leicester Outfall Culvert, and it is to this that I should like to add a few explanatory remarks.

Any one reading the description would come to the conclusion that cellar-flooding formerly took place in the whole town of Leicester, and that the new culvert was intended to free the whole town from this and its attendant evils. Allow me to point out to you that this is not so. Though Leicester is situated in the valley of the Soar, the land on either side rises quickly, reaching an altitude of 130 ft. on the right bank, and 150 ft. on the left above the level of the river at the Sewage Pumping Station. It cannot, therefore, be said that the town is built upon a level plain; and cellar-flooding was confined to one, comparatively speaking, small, low-lying area on either side, and close to the river. It is for these two districts, in the first instance, that the new storm outfall is designed, but arrangements have, of course, been made, so as to utilise it for the whole of the town when necessary.

It is but natural that I should take a great interest in this matter, as it was my father, the late Mr. Joseph Gordon, who designed the whole of the Leicester Main Sewerage, and Sewage Disposal Works. He presented his first report on the Sewage Disposal Work on November 14, 1884, and on October 22, 1885, the Town Council agreed to purchase land for a sewage farm; the agreement with the owner of the land bears the date February 9, 1886.

In the same month he presented his report on the New Main Sewers for Leicester, which the Town Council sanctioned three months later, viz., May 25, 1886.

When my late father left Leicester on September 1, 1889, to take over his new appointment as Engineer-in-Chief to the London County Council, both the Main Sewerage and Sewage Disposal Works were well in hand. I should add here, however, that after his leaving Leicester, various alterations and deviations were made from his original ideas, for which, I am sorry to say, the ratepayers have had to pay very heavily, without, so I am informed, obtaining any corresponding advantages for them. For the new main sewers the excess of the actual cost over the estimate was, down to March 25 of this year, about 9,000*l.*, and for the outfalls about 24,000*l.*, which sums together represent an excess of 25 per cent.

Both works are not yet completed, and the excess finally may be still greater. T. S. GORDON.

Leicester.

SMOKE PREVENTION.

SIR,—I believe that some little time since demonstrations were given on the embankment of a process for washing the results of combustion as they entered the chimney, and that the unconsumed carbonate was intercepted, and nothing was seen but a little white vapour. I should be glad to learn, through your columns, whether this process has in work proved useful, and if so, where it may be seen in operation. SOMERS CLARKE.

The Student's Column.

GEOLOGY XIII.

THE NATURE AND USES OF METAMORPHIC ROCKS.

THE origin of metamorphic rocks has been sufficiently discussed in this column in a previous article. It is our present purpose only to define the structure, composition, and uses of different kinds of material falling into this division, in so far as they may be useful to the architect.

Marble.—Properly so-called is a true crystalline limestone—that is to say, it contains no definite traces of fossils, and, if these were ever present, they have been transformed into crystalline mineral matter together with the whole of the other constituents of the original rock. When pure it is white, and has a texture somewhat resembling that of loaf-sugar in outward appearance, from which circumstance it is not infrequently alluded to as "saccharoid marble." As it has resulted from the metamorphism of limestone, its chemical composition is mainly carbonate of lime, though this will vary according to the presence of impurities of various kinds.

Fig. 1 shows the appearance in transmitted light under the microscope, of a piece of white statuary from Carrara, which is an example of a typical marble. It may be described as an aggregate composed of crystalline calcite granules

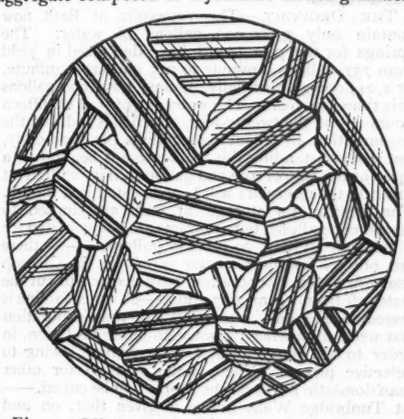


Fig. 1. *Micro-Structure of Statuary Marble.*

of tolerably uniform size, each of which possesses distinct lines of cleavage, and what are known as "twin lamellæ." The student is requested to compare the micro-characters of this rock with those of the aqueous limestones depicted in Article XI.; the great difference in structure is at once observable. The texture of statuary marble varies considerably, and its quality is often determined by the sculptor from that standpoint alone. Its freedom from light blue veins, specks, &c., is not enough to gauge the value of marble for statuary purposes, as some seem to imagine, although, of course, it must be white to be of very excellent quality. The minute calcite granules are more brittle in some saccharoid marbles than in others, and the grain is not always even, characters of supreme importance in facilitating or retarding the sculptor's work, as the case may be, and its quality and finish also. Such variations in structure, although often difficult to detect without actually tooling the stone, are immediately apparent when studied under the microscope, and very little practice is required to enable the student to determine these points.

The so-called shell-marbles, Madrepore-marbles, crinoidal-marbles, &c., are not marbles in the true sense of the term, although in some instances the limestones constituting them have been partially metamorphosed, and the organic remains much altered.

In addition to forming the only material really suitable for statuary, the inferior kinds are polished and used for decorative purposes, their veinings and divers fanciful patterns investing them with a certain amount of interest. Good lime is often made from the odd blocks and pieces about the quarries.

Quartzite. — Metamorphosed sandstone; its chemical composition is almost pure silica, though the presence of impurities will naturally cause some slight variation. Under the microscope the original quartz grains (sand) are distinctly seen (fig. 2) enveloped by a matrix of silica, the whole being remarkably compact. The rock breaks with a conchoidal fracture. It is quite unfit for building purposes, being so intractable in the hands of the mason. Nevertheless it is one of the most durable stones known, and is largely employed in some localities as road-metal. We cannot say that it makes an excellent road-stone,

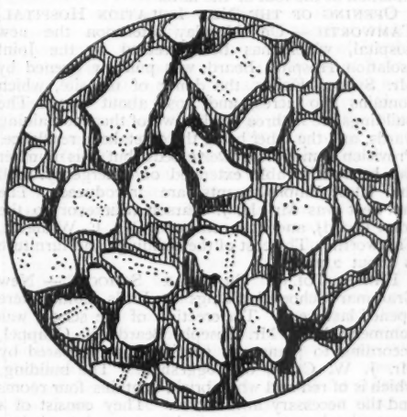


Fig. 2.—*Micro-Structure of Quartzite.*

for, although very hard, it lacks the quality which all good materials for road-making should possess, namely, toughness. The principal object of our describing and illustrating the structure of quartzite is to show the student how a sandstone may gradually be altered by metamorphism until it becomes useless for building purposes.

Slate.—Metamorphosed clay; chemical composition silicate of alumina, with variable proportions of iron and other mineral matter, according to purity. Good slate may be split up into exceedingly thin slabs, the planes which determine the direction of the splitting being termed cleavage planes. Ordinary clay on being examined under the microscope is seen to be composed of minute particles of matter indiscriminately mixed together; moreover, it is normally soft and plastic. On looking at the micro-structure of slate (fig. 3), on the other hand,

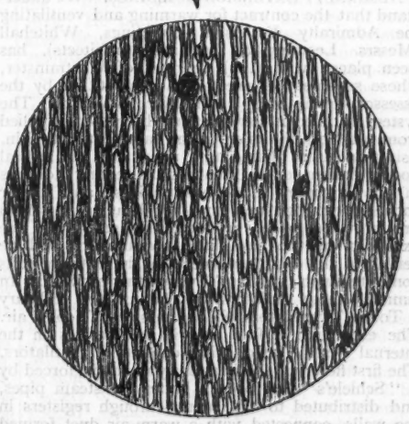


Fig. 3.—*Micro-Structure of Slate.*

the student perceives that the minute particles have assumed a definite position; they are more or less elongated, and occur in lines or planes with their longer axes running parallel with each other. The spaces between these lines or planes, it is easily conceived, are positions of weakness, and the rock may be split up along them in the direction indicated by the arrow. Such a structure is termed "slaty cleavage," and from the manner of its origin is quite independent and has no connexion with planes of bedding of the original sedimentary material. The following diagram, representing a section across a tract of country wherein cleavage structure has been set up, serves to illustrate this point:—

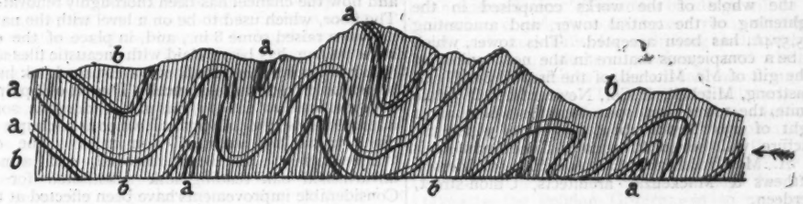


Fig. 4.—*Geological Section showing the Relations between Cleavage and Bedding.*

a. Lines of bedding slightly contorted.
b. Cleavage planes, not contorted, fairly parallel with each other, produced by lateral pressure.
The arrow indicates the approximate direction of pressure.

Cleavage structure has been artificially produced for the purposes of lecture-room demonstration.

The precise thickness into which slates can be split is determined by two factors, (1) by the relative size and character of the particles composing them, and (2) by the amount of pressure exerted by Nature in their formation. The latter is not, perhaps, so frequently the cause of "bad slate" as the former. On entering a slate quarry the visitor sees an immense amount of waste material which cannot be cleaved at all, although it was found amongst the good slate. This is inevitable from the variable nature of the original "clay," which is mostly composed of layers of fine clay, alternating with thin bands of clayey sands, more or less impure, or with streaks of sand, &c., &c. If the clay were uniform in structure, and the pressure used in producing the slaty cleavage in it were uniform throughout the mass, we should not expect to find any slate which would not properly cleave in the hands of the experienced workman.

Slate frequently contains much iron pyrites. It is a most useful material; the thicker slabs, which are not suitable for roofing purposes, are employed in the construction of cisterns, billiard-tables, counters, chimney-pieces, &c. It is often enamelled, and, we are sorry to add, is then made to do duty as "marble" of various kinds, the patterns being produced by the enameller. In the districts where slate is quarried we have seen thick blocks of it used in building the walls of houses; and the odd chips and refuse are sometimes manufactured into bricks of excellent quality; we feel sure that there is a greater scope for this than has hitherto been imagined.

Other well-known metamorphic rocks, occasionally used locally for the rougher kinds of building, and for road-metal, are gneiss and schist, of which there are many varieties in the British Isles, but which have no special attraction for the architect. They sometimes crop up in cases connected with water supply, however, when the joints and cracks in them on a large scale have to be studied rather than the substance of the rocks themselves.

GENERAL BUILDING NEWS.

MORLEY, YORKS.—On Saturday, September 16, the foundation-stone of the new church of St. Paul's, Morley, was laid by the Duchess of Devonshire, to whom a silver trowel was presented by the teachers and children of the Sunday School. The new church is being built upon the site of a small and poorly-built building erected in 1877. The old building has been removed, and is to be partially rebuilt as part of the north transept and vestries in the new church. The new church consists of a nave 95 ft. long, 28 ft. broad, and 40 ft. high, and is divided into five bays. The two easternmost arches, of arcade on either side, open into north and south transepts, the latter being double gabled, and form the nave of a side chapel. An apsidal baptistry is placed at the west end, with north and south porches. A lofty arch, carried up into the roof, divides the nave from a chancel 44 ft. in length and of the same height and width as the nave. The altar is raised nine steps from the nave floor level, and sanctuary, fitted with requisite accessories and ample space, is allowed for a large choir organ chamber and vestries, and heating arrangements are placed on the north side of chancel. The church, when completed, will accommodate nearly 900 adults. The cost of the nave, *i.e.*, the portion now in hand, will be about 5,500*l.*, and the cost of chancel, vestries, and chapel will be about 3,000*l.* The building is being carried

out from the designs and under the immediate supervision of Mr. George H. Fellowes Prynne, of Westminster, and the contract has been undertaken by Messrs. Sugden Bros., of Morley.

ABERDEEN UNIVERSITY EXTENSION SCHEME.—The works embraced in the second instalment of this large scheme have now been contracted for—being the extension of the north wing at Marischal College, and containing accommodation for the departments of chemistry, botany, surgery, and pathology. The aggregate of the accepted offers is, in round numbers, 17,000*l.* At the same time, the tender of Mr. John Morgan, builder, Aberdeen, for the whole of the works comprised in the heightening of the central tower, and amounting to 5,574*l.*, has been accepted. This tower, which will be a conspicuous feature in the new buildings, is the gift of Mr. Mitchell, of the firm of Sir W. G. Armstrong, Mitchell, & Co., Newcastle. Of white granite, the tower and spire together will reach a height of 230 ft., for about 150 ft. of which the structure will be 40 ft. square. The architect is Mr. A. Marshall Mackenzie, A.R.S.A., of Messrs. Matthews & Mackenzie, architects, Union-street, Aberdeen.

WAINFLEET ST. MARY, LINCOLNSHIRE.—This parish church was re-opened on 12th inst. after restoration. The work, which was carried out as a memorial to the late Mr. James Martin, of Wainfleet, includes taking down and rebuilding the north arcade, organ chamber, new roofs, reseating, and paving. The outlay has been about 1,600*l.* Mr. J. Boothroyd Corby, of Stamford, was the architect, and the work was executed by Mr. J. T. Turner, builder, of Wainfleet. The heating apparatus (hot air) was fixed by Messrs. Trusswell & Son, of Sheffield; the wood-block floors by Mr. Roger Lowe, of Farnworth.

GRAMMAR SCHOOL FOR OLDHAM.—The foundation-stone was laid on the 16th inst. of a grammar school for boys and girls living within the parliamentary borough of Oldham. The school is to be built and endowed from the funds of the Hulme Trust estates. The architect (Mr. J. W. Firth) in his description of the schools states that they are being built to accommodate 250 boys and 150 girls, on a plot of land about eight acres in extent. The buildings are to be placed on the crown of the hill, with the front to the south-west, overlooking Manchester. A large space of land is being reserved behind for a playground for the boys, and the land at the front of the buildings is to be laid out in terraces, with lawn-tennis grounds and for outdoor games. The basement floor will contain gymnasium, dressing-rooms, a workshop for boys and a recreation-room for girls, separate dining-rooms, and also drying stoves for clothing. On the ground floor will be separate entrances with offices or waiting-rooms, private rooms for use of master and mistress, with lavatories, &c. There will be a large central hall capable of seating about 600 persons, with corridors round the same on three sides, from which will be access to thirteen classrooms, lighted from the left, and with a separate desk for each scholar. A laboratory is also provided to accommodate thirty-six students. The style of the building is Gothic. The school is to be built with Ruabon bricks, with red terra-cotta dressings, with heads and sills of stone. The whole of the contract is let to Messrs. C. Schofield & Co., of Oldham.

NEW HIGHER-GRADE SCHOOL IN CHEETHAM.—The foundation-stone of the new higher-grade mixed school which the Manchester School Board is erecting at Heath-place, Cheetham, was laid by Mrs. C. P. Scott on Saturday. The architects are Messrs. Royle & Bennett, whose plans show a building having a frontage to Heath-place of 120 ft. The structure will be three stories high, and will accommodate 500 boys and girls on the first floor, which comprises six classrooms and a hall, together with a master's room, teachers'-room, and two cloak-rooms. The ground floor contains a gymnasium or assembly hall, two cloak-rooms, a manual instruction-room, a teachers' room, and two covered playgrounds. The second floor contains a drawing-room, two science classrooms, a chemical laboratory with store and balance rooms, a cookery classroom, and a teachers' room. There are three spacious and easy staircases, all giving convenient access to the corridors, which directly communicate with the various rooms. The total cost, including the site, furniture, and fittings, will amount to about 15,000*l.* The contractors are Messrs. R. Neill & Sons.

THE NEW "BENTHAM BUILDINGS," NEWCASTLE.—The new property called "Bentham Buildings," lately erected in The Side, is a handsome structure in the style of the Italian Renaissance, the bottom story being built of red Aberdeen granite, with polished mouldings and fine axed surfaces, whilst the superstructure is faced with Prudham stone. The ground floor is occupied as a depot by the owner of the premises, Mr. J. H. Bentham, for the sale of goods, and there is a large warehouse behind, and extensive cellarage underneath. The suite of offices on the first floor is occupied by Mr. Bentham, and connected with the ground floor by a circular iron staircase. In the rear of the first floor, and on the floors above, are five other suites of offices to be let, and a residence for a caretaker. The entire block has been substantially built, and its elegant and modern improvements present a striking contrast to the old-fashioned building which formerly stood on this site. The work of the new premises has been carried out by Messrs. J. & W. Lowery, from the designs of Mr. Edward Shewbrooks, architect. Mr. Robert Beall executed the granite work and carving; the plumbing was entrusted to Mr. Mansfield Gibson; and the drainage was laid under the supervision of Mr. Thorburn, of the North-Eastern Sanitary Association.

RESTORATION OF HINTON BLEWITT CHURCH.—The quaint old church has been in a dilapidated state since it was struck by lightning some years since. At that time the chancel roof was restored, and now the chancel has been thoroughly renovated. The floor, which used to be on a level with the nave, has been raised some 8 in., and, in place of the old stone paving, has been relaid with encaustic tiles and blue lias steps. New stalls of unvarnished oak have been also placed in the chancel. The old oak pulpit, with its sounding canopy, has also undergone some improvements, the principal of which is a couple of black enamelled wrought-iron rails. The old "three-decker" has been removed, and a new unvarnished oak reading-desk substituted for it. Considerable improvements have been effected at the west end, the old oak gallery having been removed, and the fine old arch, which it effectively concealed, renovated and brought into prominence once again. A new oak door has also been substituted for the dilapidated affair which formerly existed at the western entrance. The old carved stone font, with a square basin, has had a new shaft affixed to it, and been brought out from its place of concealment under one of the columns, and placed in a prominent situation at the foot of the nave.

OPENING OF THE NEW ISOLATION HOSPITAL, TAMWORTH.—On Monday afternoon the new hospital, which has been erected by the Joint Isolation Hospital Board, was publicly opened by Mr. Sydney Fisher, the donor of the site, which contains two acres, and cost about 500*l.* The buildings are in three blocks, two of them containing wards, and the other being the caretaker's residence. Provision is made for twelve beds, but this number can be considerably extended on emergency. All the latest improvements are introduced. The architect was Mr. H. J. Clarson (Surveyor to the Joint Board), and the contractor Mr. E. Williams, Tamworth. The cost of the buildings and furniture is about 2,000*l.*

EARLS COLNE GRAMMAR SCHOOL.—New Grammar School buildings at Earls Colne were opened last week. The erection of the school was commenced by Mr. Joseph Beard, of Chappel, according to plans and specifications prepared by Mr. J. W. Clark, of Coggeshall. The building, which is of red and white brick, contains four rooms and the necessary ante-rooms. They consist of a large schoolroom and two classrooms, intended to accommodate from sixty to eighty scholars, and a chemical laboratory. The rooms are lofty and well lighted, and the sanitary arrangements are satisfactory. There is a large gravelled playground, and two acres of grass land are available for football and cricket. About 1,250*l.* has been spent on the school and premises, excluding the furnishing of the laboratory.

WIGAN.—A new home for the Sisters in connexion with the Parish Church of All Saints, Wigan, was opened on Tuesday last by the Dean of Lincoln. The home is a large one, in the Elizabethan style of architecture, with upper portion of oak half-timber. The entrance porch is also in oak. The oratory is fitted up with stalls, &c., as a private chapel. The architects are Messrs. Heaton & Ralph, Wigan, the builder being Mr. C. B. Holmes, Wigan. The whole has been carried out by the architects to the instructions of Canon G. T. O. Bridgeman, Rector of Wigan.

SANITARY AND ENGINEERING NEWS.

ADMIRALTY EXTENSION BUILDINGS.—We understand that the contract for warming and ventilating the Admiralty Extension Buildings, Whitehall (Messrs. Leeming & Leeming, architects), has been placed with Mr. J. Jeffreys, of Westminster, whose scheme was selected in competition by the assessor appointed by H.M. Office of Works. The system adopted is low pressure hot water, supplied from two Cornish boilers in the basement, with 8-in. rising and 4-in. distributing mains to the several floors, fixed in covered trenches and serving radiators in the corridors, staircases, offices, and larger rooms requiring supplementary heat to the open fires provided in the architects' design. With the exception of the first floor, the building will be ventilated by fresh-air inlets in the outside walls connected with "Jeffreys'" ventilating radiators. In summer these radiators will be used as ordinary "Tobin" ventilators for admission of cold air. The extraction of foul air will be by flues in the internal walls, fitted with extraction ventilators. The first floor will be heated by warm air forced by a "Schiele's" fan over a battery of steam pipes, and distributed to the rooms through registers in the walls, connected with a warm-air duct formed in the ceiling of ground-floor corridors. The external air, before passing through the fan, will be cleansed by wire screens in the fresh air shaft, fitted with a water-spray for removing impurities as fast as collected, ensuring a free passage of the incoming air. After passing over the battery the warmed air will be moistened by a water-curtain, and regulated by a hygrometer to the proper degree of humidity. A steam boiler is provided for supplying power to the engine driving the fan, also for heating the steam-pipes in battery, and supplying hot water to the lavatories by means of steam heaters in various parts of the basement. The steam-power will be utilised in addition for pumping the sewage from a sump in the basement to the level of the sewer. The whole of the cast-iron pipes used in the work will have lathe-faced flanges. If placed in line, this piping would extend a distance of rather more than two and a half miles.

THE SANITARY INSTITUTE.—An extensive syllabus of lectures and demonstrations for Sanitary Officers during the coming season has been prepared by the Sanitary Institute, Parkes Museum, Margaret-street. The course will open on Friday, the 29th inst., with a lecture on elementary physics and chemistry, to be followed, on October 3, with a lecture on lighting, ventilation, and warming, by Sir Douglas Dalton. Numerous others will be given by well-known experts at frequent intervals during that and the ensuing month. The programme also includes visits to sewage farms and works, disinfecting stations, isolation hospitals, and other places of special interest to the students in London and the environs.

THE NEW DRAINAGE SCHEME AT GRIMSBY.—A meeting of the Grimsby Town Council was held on the 12th inst., the Mayor in the chair, to consider the tenders received for the carrying out of the proposed new drainage and other works, and to determine what tenders should be accepted and contracts entered into.—The Mayor said the recent development of typhoid fever in the town indicated that even the precautions and arrangements which they already contemplated were not sufficient to meet the whole sanitary requirements of the case. It was now suggested that they should have a well bored, and they were informed that they could have one yielding 500 gallons of water per minute for 300*l.* complete. The committee and a sub-committee had opened the tenders for the drainage works, and the lowest tender for the sewage work and the pumping-station was that of Mr. A. F. James, for 17,950*l.* 10s. 7d., which was accepted.

THE DROUGHT.—The reservoirs at Bath now contain only 3,000,000 gallons of water. The springs for the past month have decreased in yield from 757 gallons a minute to 725 gallons a minute, or 1,044,000 gallons daily, against 1,259,000 gallons this time last year. The water is now cut off fifteen hours out of the twenty-four, which has reduced the consumption by about four gallons per head daily, but notwithstanding this the reserve is being drawn upon at the rate of 100,000 gallons a day, so that at this rate the reservoirs will be exhausted in a month. The facilities for storage at Bath are limited to 10,000,000 gallons, but contracts are being invited for a reservoir to hold 50,000,000 gallons.——As there are only a few days' water supply in the Glossop reservoirs, the Corporation have decided to cut the water off from 8 p.m. to 7 a.m.——A water famine is feared in Dublin. The officers of the Corporation last week commenced a house-to-house visitation, in order to see that no waste is permitted, owing to defective pipes. Where water is used for other than domestic purposes the supply will be cut off.——At Tunbridge Wells notice is given that, on and after the 16th inst., until further notice, the supply of water to the town will be discontinued from six o'clock in the evening to six o'clock in the morning.

LONDON WATER SUPPLY.—In their report for August on the quality of the water supplied to London last month, Professor Crookes and Professor Odling state: The long-continued dry weather, which had lasted from March to the middle of June, showed signs of breaking during the latter month, and when writing our last month's report we were able to say that the rainfall for July had been 3·70 in. at Oxford, whereas the mean fall for twenty-five years was 2·58 in. showing an excess of 1·12 in. The sudden and excessive rainfall, following one of the longest droughts ever recorded, was extremely slight in respect to the variation in quality of the metropolitan water, and imperceptible in respect to any injurious tendency. This excessive rainfall was not kept up during August. The mean fall for this month, over an average of twenty-five years, is 2·24 in. at Oxford, while the actual fall has only been 1·01 in. showing a deficiency of 1·23 in. During the whole of the month there was only two really wet days, namely, the 4th, on which 0·35 in. and the 22nd, on which 0·26 in. of rain fell; the rest of the month's rain, amounting to four-tenths of an inch, being distributed over eight days. The excess of rain in July being 1·12 in. and the deficiency in August being 1·23 in. it is seen that for the two months the rain has been 0·11 in. below the twenty-five years' mean, whilst, including June, the three months' deficiency amounts to 1·55 in. The Royal Commission which was appointed to ascertain whether the sources available within the water-sheds of the Thames and Lea are adequate in quality and quanity for the water supply of the Metropolis has finished its labours, and has just presented its report to Parliament. The Commissioners express the opinion that the water as supplied to the consumer in London is of a very high standard of excellence and purity, and that it is suitable in

quality for all household purposes. With respect to the quantity of water which can be obtained from the water-sheds of the Thames and Lea, they are of opinion that an average daily supply of 40,000,000 gallons can be fairly obtained from the wells and springs in the Lea Valley. From wells in the chalk area on the south side of the Thames, in the district of the Kent Company, they estimate that a daily average of 27,500,000 gallons might be obtained. With adequate additions to the present system of storage they think that from the River Lea 52,500,000 gallons might be taken daily, and by the construction of storage reservoirs in the Thames Valley it would be possible to obtain an average daily supply of 300,000,000 gallons, without taking in any objectionable part of the flood water and leaving at least 1,000,000,000 gallons daily to flow over Teddington Weir into the tidal part of the river. From the sources and by the methods which they set forth a total daily supply of 420,000,000 gallons might, in their opinion, be obtained. This they consider would be sufficient to supply 35 gallons per head to a population of 12,000,000 persons, which is about three-quarters of a million in excess of the total population which Greater London, together with the outlying parts, would have attained in the year 1931, even if the ratio of increase in the period of 1881-1891 were fully maintained.

INSANITARY STATE OF THE MANCHESTER SHIP CANAL.—Much alarm is being felt in Manchester, Salford, and neighbourhood owing to the insanitary condition of the Manchester Ship Canal. The danger is not confined to these localities alone, but extends along the entire course of this polluted water, which is little better than an open sewer. Though the Mersey and Irwell Local Committee have important powers, and numerous representations as to the danger and nuisance have been made to them, they have not taken any adequate steps to provide a remedy. The matter has become one of such serious importance that the Salford Town Council, at their last meeting, adopted a resolution to the effect "That the nuisance arising from the Ship Canal having become intolerable, and a source of considerable danger to the health of the inhabitants of Salford and neighbourhood, and no adequate repressive action having been taken by the Rivers Mersey and Irwell Local Committee, it has become imperative, to satisfy the demands of the public, that a Government inquiry should be held, to determine as to the best means of dealing with the subject, and that the members for the county boroughs be requested to bring the subject before Parliament, and to move that an inquiry by the Local Government Board should be instituted, in order that the entire subject may be dealt with in a manner befitting its pressing urgency and importance." A better state of things cannot be expected until strong measures have been adopted for the purification of the tributaries to the Irwell.

PRESENTATION TO A SURVEYOR.—Mr. Thomas Bennett, C.E., late Surveyor to the Cheshunt Local Board, has been appointed managing engineer to the Cape Town Waterworks Company. There were seventy-three applicants for the post. Several of Mr. Bennett's friends residing at Cheshunt, on hearing of his success, thought they would not like him to leave England without some token of their esteem. A committee was formed, and over forty persons subscribed, upwards of 40*l.* being collected. With this amount the committee purchased a handsome gold watch and chain, which, together with a purse containing a balance of 9*l.*, was presented to Mr. Bennett on Thursday.

NEW BATHS FOR MARYLEBONE.—The Local Government Board, acting on the advice of Colonel Lugard, R.E., who was appointed to make inquiries in the matter, have decided to grant permission to the Commissioners of Baths and Washhouses for the Parish of St. Marylebone to borrow the sum of 20,000*l.* for the purpose of reconstructing the public baths in Marylebone-road. It is proposed by the Commissioners to borrow the money over a period of several years, so that the burden will not fall heavily on the ratepayers.

STAINED GLASS AND DECORATION.

ST. MARY'S, CRUMPSALL, MANCHESTER.—This church was reopened on Sunday last after an entire decoration. The eighteen arcades of the chancel have been filled with paintings, life-size, of the apostles, evangelists, Latin doctors, and later saints—two in each arcade. The paintings are in spirit fresco in the style of the late fifteenth-century, and are based on examples of Dürer, Memling, and Van der Weyden. The paintings were executed by Messrs. Percy, Herbert, & Archie Bacon (working under the style of Percy Bacon & Bros.).

ST. PETER'S, PLAISTOW.—A new three-light window has been recently placed in this church. It represents three English female Saints, St. Eanswide, St. Osyth, and St. Ethelburga, the centre light being a portrait of the lady whom the window commemorates. The window was erected at the cost of Mr. Robert Hunt, of Upton-park, and executed by Messrs. Percy Bacon & Brothers, who have already one window in the church, both windows being put up under the supervision of Sir Arthur Blomfield.

FOREIGN AND COLONIAL.

FRANCE.—MM. Bonnat, Bouguereau, Puvis de Chavannes, and Paul Dubois have been named members of the jury for the competition opened to French glass painters for the execution of the windows for the Cathedral of Orleans. The windows are to illustrate the principal events in the life of Joan of Arc.——At the cemetery of Montmartre has just been inaugurated the monument raised to the memory of Colfavru, formerly a deputy and president of the "Conseil de l'Ordre du Grand Orient de France." The monument is the work of the sculptor Beylard.——At the Père La Chaise cemetery has been inaugurated a monument to Emile Eudes, a celebrated revolutionary, who was general during the insurrection of the Commune. M. Tony Noël is the sculptor.——The Museum of Saint Germain has been enriched with a precious collection of antiquities discovered at Rosny-sur-Seine, near Mantes. These archæological remains include medals, sarcophagi, and portions of the substructure of a Gallo-Roman basilica, and a pagan altar very well preserved.——Mdme. Laure Coutan has been commissioned by the Government to execute a large decorative statue to adorn the Palais Mustapha, the residence of the Governor-General of Algeria.——The committee formed with the view of erecting a monument to Meissonier in the principal square of Poissy, has accepted the design of M. Frémiet, which represents the painter standing, in his working costume, holding palette and brushes in his hands.——The inauguration of the statue of General Lassalle, killed at the battle of Wagram, will take place at Luneville on October 8. It is an equestrian statue, and was exhibited in the Salon of this year.——To-morrow (Sunday) is to be laid the first stone of a monument which Mgr. Pagis, Bishop of Verdun, is raising at Vaucouleurs to the memory of Joan of Arc. The restoration of the ancient chapel in which the heroine used to pray has just been completed.——It is announced that, in spite of the strong protestations of M. Pons, the architect of the Department of Aveyron, the municipality of the little town of St. Sernin-sur-Rance have demolished a picturesque fifteenth-century house which served as the Mairie, and was well known to tourists.——The death is announced, at the age of 76, of M. Adolphe Yvon, a well-known military painter. M. Yvon was born at Esehwiller (Moselle), and worked in the atelier of Paul Delaroche. When still young he executed a series of designs from Dante, "Les Sept Péchés Capitaux," which obtained him a première médaille at the Salon of 1847. His first large painting, which belongs to the Versailles Museum, was the "Retraite de Russie," which gained for its author the cross of the Legion of Honour in 1855. M. Yvon was sent by the Government to the Crimea to follow the operations of the Anglo-French army, and made a series of large pictures of events in that campaign, of which the most celebrated is "Le Prise de la Tour Malakoff," which obtained the médaille d'honneur at the Salon of 1857; then followed two other pictures which attracted much attention, "La Courtine" and "La Gorge de Malakoff." After the war in Italy M. Yvon once more received the commission of the Government, and painted two pictures, "Magenta" and "Solferino," which, like the "Prise de Malakoff," are also at Versailles. After the International Exhibition of 1867, M. Yvon was named officer of the Legion of Honour. In 1883 he was appointed Professor of Drawing at the École Polytechnique, as successor to Léon Cogniet. Since the war of 1870 he had almost entirely occupied himself with portrait painting. Among his more recent works of this class may be mentioned the portraits of Dr. Péan, of M. Paul Bert, and of M. Carnot, the latter of which at present figures in the centre of the French Section of Painting at the Chicago Exhibition.——We have to record also the death of M. Victor François Hügelin, architect, of Paris (where he died), who was a frequent contributor to the "Revue Générale de l'Architecture" since 1854. He published there a number of remarkable drawings, and was much appreciated as an able artist and draughtsman. Another architect who has just died is M. Hachet-Souplet, of Saint Quentin, Vice-President of the Société des Arts, founded in that town, and President of the Société des Architectes de l'Aisne.——M. Nagel, the sculptor, has completed the monument commemorative of the siege of Maubeuge in 1793. The monument is adorned with a statue representing a young drummer aged sixteen years, named Sthrau, who conducted himself with great bravery in the siege, and was killed while beating the "Charge."

THE ANTWERP INTERNATIONAL EXHIBITION.—The International Exhibition, which is to be held at Antwerp next year, will be opened on May 5 and close on November 12. The exhibition will include products of all the industries, as well as of the arts and sciences, and it will comprise special Naval, Military, Colonial, and African sections. The Arts section will be under the auspices of the Royal Society of Fine Arts of Antwerp, which will hold a special exhibition of paintings, sculpture, and medallions, engravings and lithographs, and architectural models and drawings. The other groups are the following:—Education, the liberal arts, art industries, mineralogy, engineering construction, smaller mechanical industries, electricity, textile industries, clothing, locomotion, chemical industries, substances of food as products of industry, civil engineering, navigation, trade, the art of war, agriculture, forestry, fisheries, and horticulture, as well as the building and house-furnishing trades, making altogether twenty-two groups. In the building and house-furnishing trades will be shown building materials, plant, and tools used in the building trades, heating, ventilation, and lighting apparatus, furniture and upholstery, toys and baskets, and bric-à-brac. The site of the exhibition is in the new quarter of Antwerp, near the river Scheldt and the new docks. It will cover an area of about 2,000 acres, and will be connected with the principal railways. The main buildings will be very extensive, covering 120,000 square yards of ground, and including halls for exhibiting industrial and commercial products, machinery and electrical appliances, as well as a concert-hall measuring some 6,000 square yards. The exhibition will be built of iron and steel, and roofed with zinc. Intending exhibitors should apply for forms of application for space to "The Executive Committee of the Exhibition," No. 9, Rue Gérard, Antwerp," not later than October 1 next. The necessary steps have been taken by the Belgian Government to prevent any infringement of patent rights and trade-marks. An international jury will be appointed for giving the awards, which will comprise diplomas and medals (grand prizes), diplomas (honour), gold, silver, and bronze medals.

MISCELLANEOUS

A TOTTERING CHURCH.—Alarm has been caused in the little Lincolnshire parish of Sutton St. James by the church walls suddenly developing huge rents, the jambs and tracery of the windows shifting out of their places, and the entire fabric, especially the apsidal east end, being in a tottering condition. The edifice has altogether the appearance of having been subject to some sudden and violent subterranean disturbance. Some of the rents in the masonry are very large, and the condition daily becomes worse. The building is six inches out of the perpendicular. Temporary steps have been taken to prevent the tracery and glass falling out by boarding up, and, meanwhile, a consultation of architects has been summoned. Only a few years ago 1,600*l.* was spent in the restoration of the church. The architect, Mr. Bassett Smith, of London, in his report says the subsidence has been caused by the dry weather acting upon foundations which consist of clay and silt, the result being a contraction of the soil. The east end walls of the church have bulged five inches. The three sides of the apse wall require rebuilding, and the foundations must be lowered several feet to prevent the action of the weather in the future on other parts of the edifice.

SUBSIDENCE IN THE CITY-ROAD.—There have of late been subsidences of the roadway near Wesley's Chapel in the City-road, and these have been generally attributed to the openings made for gas and water mains. The Surveyor to the St. Luke's (Middlesex) Vestry told the members on Tuesday that the real cause of the subsidence was the existence of springs which silted the sands and earth, and there was great danger in the fact that the gas mains were practically left without support beneath them. Should these mains drop there was the danger of explosions of a very serious character. The Surveyor said it was a matter for the London County Council, who had the control of the main drainage.

THE RATEABILITY OF SEWAGE WORKS.—In the House of Lords, last week, judgment was given by the Lord Chancellor in three appeals which involved the question of the nature and extent of the liability to the rates of the London County Council, in respect of pumping stations, outfall sewers, &c. It had been contended on behalf of the County Council that these works were not used, and were incapable of being used, for purposes of profit, and that the amount of assessment ought, therefore, to be merely nominal; and to this contention the Court of Appeal had practically given effect in the cases of St. George's and West Ham, but had decided in the opposite sense, on authority of a precedent, in the Erith case. The Lord Chancellor, in the course of an elaborate judgment, dwelt on the unsatisfactory state of the law, and of the decisions of the Courts in regard to the questions involved, holding that beneficial occupation in the sense of the making of profits was not essential in order to make the hereditaments liable to rating, and pronounced that the judgment of the Court of Appeal must be confirmed in the Erith case, and reversed in the other two. The other law lords concurred. The effect of the judgment is that the pumping stations and outfall sewers—the latter only so far as they are above ground—will be liable to rates in the ordinary way.

TRADE ANNOUNCEMENT.—Messrs. Fambrini & Daniels have just completed the extension of their art concrete works at Lincoln, and have taken as a managing partner Mr. F. Webster, of Lincoln.

APPOINTMENT OF SURVEYOR, ASHBY-DE-LA-ZOUCH.—Mr. T. B. Warren, Southam, has been appointed Surveyor and Inspector of Nuisances to the Rural Sanitary Authority, out of sixty applicants. The post was rendered vacant through Mr. Metcalf having accepted another appointment.

CONTRACTS AND PUBLIC APPOINTMENTS.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Two Wards, Kendray Hospital	Barnsley Town Council	J. H. Taylor	Sept. 26
Road Materials	Southampton Corp.	W. G. B. Bennett	do.
Re-building Warehouse, &c. Bull Green, Halifax	.....	Jackson & Fox	do.
Public Offices, Flowergate	Whitley Local Board	T. K. Scott	do.
Street Works	Nelson (Lancs.) Corp.	J. W. Bradley	do.
*Road-Making and Paving Works	East Barnet Valley Local Board	G. W. Brumell	do.
*Sewers Works	Crewe Town Council	G. Eaton-Shore	do.
Coastguard Station, Bunowen, co. Galway	Public Works Office	*Official*	do.
Repairs to Guildhall, &c.	Rochester Corp.	do.	Sept. 27
School Buildings, Offices, &c. Wimbotshaun, Norfolk	Stow Bardolph (U.D.) School Board	E. J. Colman	do.
Water Supply, Newbridge-on-Wye	Rhayader R.S.A.	Telfer Smith	do.
Kerbing, Channelling, &c.	Handsworth (Staffs.) Local Board	E. Kenworthy	do.
Stone Road Metal, &c.	do.	do.	do.
*Additions, &c. to Hotel	Ascot Royal Hotel	.....	do.
*Asphalte Paving Works	Parish of St. George's-in-the-East	G. A. Wilson	Sept. 28
Additions to School Buildings, Stapenhill	Burton-on-Trent Sch. Board	R. Churchill	do.
Road Works	Horbury Local Board	T. Humphries	do.
Drainage Works, near Salisbury	Alderbury Union	J. Harding & Son	do.
Additions to Schools, Bond-street, &c.	Burton-on-Trent Sch. Board	R. Churchill	do.
Maintenance of Roads	Cork Town Council	*Official*	do.
Retaining Wall, &c. Colliery-road	Nottingham Corp.	A. Brown	Sept. 29
School Buildings, Laundry, &c. Welbeck-street	Castleford School Bd.	A. Hartley	Sept. 30
School Buildings, Rodbourne, Cheney, near Swindon	Rodbourne Cheney Sch. Board	Wm. Drew	do.
Additions, &c. to "Dun Cow" Inn, Dunston-on-Tyne	J. R. Carr Ellison	Geo. Reavell	do.
Bridge Extension, Maryport	Cumberland C. C.	*Official*	do.
School Buildings, Stairfoot, near Barnsley	Ardsley School Board	Kay & Twist	Oct. 2
*Additions, &c. Darenth Asylum	Met. Asylums Board	A. & C. Harston	do.
Welsh Congregational Chapel, Barry Dock, Cardiff	.....	Seward & Thomas	do.
Chapel and House at Cemetery	Bridgend Local Board	G. F. Lambert	do.
Levelling, Forming, &c. Barnes-way	Dorchester U.S.A.	*Official*	do.
Flagstones, Setts, &c.	Batley Town Council	do.	do.
*Cemetery Chapels, Roads, and Sewers	Acton Local Board	do.	Oct. 3
Coastguard Station, Bunbeg, co. Donegal	Public Works Office	*Official*	do.
*Waiting Rooms & Footbridge, Aberdare	G. W. R. Co.	do.	do.
*Road-Making and Paving Works	Lewisham Bd. of Wks.	do.	do.
*Making-up Roads	Brentford Local Board	J. H. Strachan	do.
Road Works	Mansfield T.C.	R. Frank Vallance	do.
Roads and Sewers, Fairwater, Grove Estate, Llandaff	.....	W. H. Dashwood Caple	Oct. 4

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Reservoir, &c. Bankhead, Lochmaleen (N.B.)	Local Authorities	J. H. Barbour	Oct. 4
*Construction of Storage Reservoir	Bath Corp. Waterworks Com.	Wm. Fox	do.
*Pair of Villas, Gravesend	Kent and Essex Land, &c. Co. Ltd.	G. R. Cobham	do.
*Boiler House and Chimney, &c.	Horsham Local Board	G. Hodson	Oct. 6
*Temporary Iron Building, Mount Pleasant	Com. of H. M. Works	*Official*	do.
*Small Houses and Shop, Oxford	Oxford Corporation	W. H. White	Oct. 7
*Concrete Flushing Tanks	Beckenham Loc. Bd.	G. B. Carlton	Oct. 9
*Footbridge, &c. Boscombe	Bournemouth Corp.	*Official*	do.
*Low-level Sewer, &c.	Belfast Corp.	do.	Oct. 10
Premises for Technical Instruction	Stafford C.C.	Bailey & McConnal	do.
Drainage (Large Contract)	Barnstaple U.R.S.A.	Arnold Thorne	Oct. 12
County Police Station, Truro	Cornwall C.C.	T. J. Hicks	Oct. 14
House, Offices, &c. Goddard Hall Estate	Sheffield Union	C. J. Innocent	do.
*Enlargement of New Station, &c. Leeds	N.E. and L. & N.W. Rly. Co.	H. Copperthwaite	do.
*Extension of Pier and Quay, &c.	Torquay Corp.	H. A. Garrett	Oct. 23
*Enlargement, &c. of Baths, Marylebone	Public Baths, &c. Com.	Waldram & Son	Oct. 24
*Erection of Baths	Hackney Public Bath &c Com.	E. Harnor & F. Pinches	Oct. 26
Twenty-four Cottages, Quaker's-yard, Pontypridd	Craigberthlwyd Building Club	W. J. Thomas	Nov. 2
*Painting Works, Weymouth	War Department	*Official*	No date
*Children's Cottage Homes, &c.	Sheffield Union	C. J. Innocent	do.
Church, Westham, Weymouth	.....	G. H. Fellowes-Prynne	do.
Stores and House, near Carlisle	Houghton Co-op. Soc.	Joseph Graham	do.
School Buildings, &c. Larne, Ireland	First Larne Presbyterian Congregation	.....	do.
Factory and Premises, Penarth-road, Cardiff	B. Benjamin	Veall & Sant	do.
Blocks, Delaney Hospital, Cheltenham	.....	Middleton & Co.	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Sanitary Inspector	St. Pancras Vestry	3*l.* per week	Sept. 30
*Surveyor's Assistant	Rochester Corp.	.....	Oct. 4

Those marked with an Asterisk (*) are advertised in this number. *Contracts, pp.* iv., vi., viii., *and* xxi. *Public Appointments, p.* xviii. *and* xxi.

NEW INFIRMARY FOR GUISBOROUGH WORKHOUSE.—The foundation-stone of the new infirmary at the workhouse was laid on Tuesday by Mrs. Petch, wife of Mr. Thomas Petch, Chairman of the Gainsborough Board of Guardians. The building will contain forty-two beds. At each end of the building will be fixed a cast-iron stair to be used in case of fire. In front of the building there will be two spacious yards containing flower-beds, and paved with cement concrete, and fenced round with iron palisades on stone-coped brick walls. The contract for the whole of the works amounts to 3,235*l.* Mr. G. M. Radge, of Normanby, is the contractor; Mr. Thomas Stokes, of Thirsk, is the architect; and the works are being carried out under his supervision.

PROPOSED FEVER HOSPITAL AT SHOOTER'S-HILL.—A Local Government Board inquiry was held on Tuesday at the Town Hall, Woolwich, to consider the proposed erection of a fever hospital at Shooter's-hill, near the Herbert (Military) Hospital. The Metropolitan Asylums Board have approved of the purchase of the land, and the scheme only awaits the sanction of the Local Government Board.

RANGES.—We understand that Messrs. Ashton & Green Iron Co., Bury-street, E.C., have purchased at the sale of Thos. Watson & Sons (now in liquidation) of Wheathill Foundry, Rotherham, all their principal and latest range patterns and models.

SOUTH LONDON ART GALLERY.—The Prince of Wales will open the new galleries in Peckham-road on Monday, October 9, at 12.30. The galleries are open daily from 3 to 5 and 7 to 9.30. The reading-room and library will be open from October 2, daily, 7 to 9 p.m. The lectures will begin on October 1, and every Monday evening a lecture will be given, especially addressed to children.

STRIKE OF PLUMBERS.—The whole of the plumbers employed in the large shipbuilding yards and engineering works at the Hartlepools came out on strike on Tuesday. The employers demand a reduction in wages of 1s. 6d. per week. The men resist this on the ground that when other sections of workmen received an advance the plumbers did not. The men have the support of the executive in London, and will therefore be entitled to strike pay.

SALE OF HENGRAVE HALL, BURY ST. EDMUND'S.—Last week Hengrave Hall, Lord Kenmare's fine old manor house, near Bury St. Edmund's, with its accompanying 4,500 acres, was sold to Mr. John Lysaght, of Bristol. Mr. Lysaght is one of the largest employers of labour in Bristol. He is the founder and head of Messrs. John Lysaght & Co., Limited, who have large ironworks at Bristol, Wolverhampton, and Sydney. Bridges, girders, and galvanised iron are their specialty, and acres upon acres of their corrugated iron are to be found in the Colonies.

IMPROVEMENTS IN BILBAO AND SANTANDER.—According to a recent report of the British Consul at Bilbao on the trade of that district for 1892, a scheme for the complete drainage of Bilbao has been decided on, consisting in conveying the sewage of the town and district on both sides of the river to the vicinity of Galea Point, distant over ten miles, where it will be discharged into the sea; but as this work will involve a very large outlay, it may not be commenced for some time to come. The port works continue to proceed very satisfactorily; the greater portion of the breakwater is visible at low water, and there is every reason to believe that in the course of two or three years safe anchorage will be available within the harbour. At Santander during the last three years, extensive works have been proceeding for the improvement of the harbour, and the embellishment of that part of the town skirting it by lengthening quays and reclaiming from the water a broad strip of land contiguous and parallel to the Boulevarde de Calderon. Further down, nearer the entrance of the port, a dry dock is being constructed 435 ft. long, 84 ft. 6 in. wide, and with entrance 62 ft. 9 in. wide. When finished, it will be a great assistance to vessels requiring repairs or overhauling, there not being a dry dock on the long stretch of coast between Santander and Cadiz. With a view to acquiring a valuable quantity of ground for building purposes and docks, an association of English capitalists, called the Santander Harbour Company, Limited, have undertaken the drainage and embankment of the morass at the upper end of the estuary, and the work is well advanced.

A SUBSTITUTE FOR LEATHER.—The Anglo-American Varnish Company, of Birmingham, sends us a sample of a material called "Tannette," which is to be a substitute for leather, and of which the qualities are stated to be that, while soft and flexible, its surface is very hard (a statement which the specimen sent to us bears out), that it is uninjured by water, and grease can be scrubbed off it; that it will take embossing (which it appears suitable for), and that it "deteriorates less with age than leather." As it is apparently a new production, it would be interesting to know how the manufacturers get their test for age; we should imagine the statement to be absurd. The material appears, examined at the back, to be a kind of finely-woven cloth with a facing in imitation of leather. It is very well done, and as a cheap substitute for leather may answer very well.

MEETING.

FRIDAY, SEPTEMBER 29.

Sanitary Institute.—Lecture on Elementary Physics and Chemistry. 8 p.m.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,776.—WINDOW VENTILATOR: *L. Young.*—This ventilator consists of two long cases sliding laterally, one within the other, so as to fit closely the window opening. Perforations are made for the admission of air, but the ventilator is draughtless and rain-proof.

189.—SASHES AND WINDOW-FRAMES: *F. Hitchmough.*—In order to facilitate the removal of sashes for cleaning, &c., and to do away with the necessity for persons sitting or standing on the window-sills for the purpose of cleaning the windows and avoiding the accidents to which they are exposed in such a position, the sash-cords are removable, and an additional cord with a hook-and-eye is provided to prevent the cords slipping back when the weight of the sash is removed. The parting bead of the window-frame is replaced by a wooden bar. This bar being removed will allow the sashes to be taken from the grooves.

1,162.—TRAP AND PIPE JOINT: *M. Syer.*—An improved joint is made by providing two metal flanges and an india-rubber ring, the flanges connected together with bolts. In fitting to closets one flange is passed over the outlet; the indiarubber ring is then put on, and last the other flange having the lead pipe bossed over the inside to fit against the rubber ring; all is screwed up, and an air and water-tight joint formed.

4,259.—FIRE-RESISTING FLOORS: *T. Potter.*—The objects are (1) to prevent the passage of sound; (2) transmission of heat in cases of fire; (3) to provide a chamber for ventilation, gas pipes, electric light wires, &c. This is done by forming ceilings, disconnected from floors of apartments above, of tubes or slabs of terra-cotta. The slabs are made to dovetail into each other.

9,770.—IMPROVEMENTS IN WATER-CLOSETS: *L. D. L. Ellis and others.*—A trap is formed, which rotates, removing the necessity of the upward lift of soil required in a fixed trap without valves. No clogging with refuse is possible, as the rotation of the trap is effected without lessening the capacity of the pipe of which the trap is formed.

12,867.—IMPROVEMENTS IN WATER-CLOSETS: *R. Lewis and another.*—Consists in the combination with the soil-pipe and the pan of a cylinder, open by its lower end to both, and by its opposite end to a flushing-cistern and a piston worked in both directions in the said cylinder, and controlling, according to its position in the latter, both ends of the cylinder, as well as the communication between it and the pan.

13,898.—GUARD FOR DOORS: *E. R. Baller.*—To prevent persons' fingers, clothing, &c., becoming shut in between the hinged edges of doors and frames, a guard, made of an angular piece of wood with spiral or straight springs, is fitted.

13,925.—IMPROVED VARNISH FOR PROTECTING WOOD, IRON, &C.: *A. Beck* (Vienna).—An improved drying lacquer which will take a polish, and is water-proof, is made of colophony, benzine, American resin, &c.

NEW APPLICATIONS FOR LETTERS PATENT.

SEPTEMBER 4.—16,570, F. Page, Joiner's Cramps, &c.—16,583, S. Pegg and H. Grace, Washing or Cleansing Machine for Gravel, Stone, &c.—16,588, H. Dean and J. Edwards, Drain Channels and Traps.—16,600, G. Burge, Ventilator.—16,611, H. Libbey, Nails.—16,612, H. Libbey, Combined Spring Hinge and Door Check.—16,613, A. Henström, Ventilating or Chimney Top.—16,627, W. Hickson, Decoration of Interiors.

SEPTEMBER 5.—16,703, J. Walton, Manufacture of Whitelead.—16,711, J. Starling, Door Furniture.

SEPTEMBER 7.—16,793, W. and J. Tweedie, Drain-Testing Appliances.—16,799, A. Anderson, Door-Fastening Furniture.—16,808, W. Millar, Pedestal Closet-seat Fastener.—16,814, T. Hyom, Door Slam and Fastener.—16,820, J. Langfield, Heating, Drying, and Ventilating.—16,829, J. Tweedale, Art Metal Work.—16,840, A. Clery,

Artificial Stones.—16,843, J. Craven, Machines for Moulding Bricks, &c.—16,859, J. Martin, Tiles, and in the method of Tiling Roofs, Walls, &c.

SEPTEMBER 8.—16,911, T. Futers, Combination Hand Saw, Square, and Rule.—16,938, E. Lanken, Burglar and Fireproof Shutters.—16,948, J. Banneter and W. Chattaway, Ventilation of Sewers, &c.

SEPTEMBER 9.—16,967, J. Birchell, Door Checks.—16,994, F. Davey, Disinfecting Water-closets and Urinals.

PROVISIONAL SPECIFICATIONS ACCEPTED.

10,974, M. Reeves, Making Doors, Shutters, &c.—14,025, J. Towle and W. Stones, Automatic Window-sash Lifter and Adjuster.—14,384, G. Smith and B. Cooper, Automatic Water-closets.—14,591, C. Sankey, Sanitary Trap or Gulley for Drain or other Pipes.—15,027, C. and A. Musker, Folding Gates and Shutters.—15,295, H. James and G. Robinson, Flush Cisterns.—15,359, A. Bellamy, Travelling Cranes. — 15,369, T. Whitehead, Extracting Ventilators or Chimney Cowls.—15,654, T. Kirk, Brick Kilns.—15,659. J. Heaton and others, Construction of the Backs of Fireplaces.—16,122, A. Martin, Stoves.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

20,181, L. Harris and W. Parkin, Dry Closets.—21,064, H. Lockwood, Composition for Flooring or Covering Iron Bridges, Arches, &c.—10,069, W. Morgan, Ventilation of Sewer Entrance Covers, &c.—11,538, L. Adams, Dovetail-key in Bricks.—15,226, W. and J. Oakes, Kilns for Bricks, &c.

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G.	ton	9/0/0 0/0/0
Teak, E.I.	load	9/10/0 15/0/0
Sequoia, U.S.	ft.cu.	2/3 2/6
Ash, Canada	load	2/5/0 3/10/0
Birch, do.		2/15/0 3/15/0
Elm, do.		3/0/0 4/5/0
Fir, Dantsic, &c.		1/5/0 2/15/0
Oak, do.		2/15/0 5/5/0
Canada		5/15/0 7/5/0
Pine, Canada red		2/5/0 2/15/0
Do. Yellow		2/5/0 4/10/0
Lath, D'ntsic, fath		4/10/0 5/10/0
St. Petersburg		5/0/0 6/10/0
Wainscot, Riga, &c., log		2/15/0 5/0/0
Odessa, crown		2/15/0 5/0/0
Deals, Finland and & 1st std	100	7/0/0 9/10/0
Do. 4th & 3rd		6/10/0 7/0/0
Do. Riga		7/0/0 8/10/0
St. Petersburg, 1st yellow		9/0/0 12/10/0
Do. 2nd yellow		7/0/0 8/0/0
Do. white		8/0/0 10/10/0
Swedish		7/0/0 15/0/0
White Sea		7/0/0 15/10/0
Canada, Pine 1st		21/10/0 28/10/0
Do. do. 2nd		16/0/0 17/10/0
Do. do. 3rd &c.		7/10/0 10/5/0
Do. Spruce, 1st		8/10/0 10/10/0
Do. do. 3rd & 2nd		6/10/0 7/15/0
New Brunswick		6/0/0 7/5/0
Battens, all kinds		3/0/0 15/0/0
Flooring boards, sq. 1 in. prep. 1st		0/9/6 0/14/0
Do. 2nd		0/7/6 0/11/6
Other qualities		0/4/6 0/7/0
Cedar, Cuba	ft.	/4 /4½
Honduras, &c		/4 /4½
Mahogany, Cuba		/4 /6½
St. Domingo, cargo av.		/3 1/6
Mexican do. do.		/3½ /4½
Tobasco do. do.		/3½ /6
Honduras do.		/4 /5½
Box, Turkey tun		4/0/0 13/0/0
Rose, Rio		9/0/0 20/0/0
Bahia		8/0/0 18/0/0
Satin, St. Doming		0/0/6 0/1/3

TIMBER *(continued)*.

Satin, Porto Rico		0/0/7 0/1/6
Walnut, Italian		0/0/3½ 0/0/7

METALS.

Iron—Pig, in Scotland	ton	2/2/7½ 0'0/0
Bar, Welsh, in London		5/7/6 6/0/0
Do. do. at works in Wales		5/7/6 5/10/0
Do. Staffordshire, in London		6/0/0 6/10/0
COPPER—British, cake and ingot		46/6/0 46/10/0
Best selected		47/0/0 47/10/0
Sheets, strong		55/0/0 0/0/0
Chili, bars		42/10/0 42/17/6
YELLOWMETALlb		0/0/4½ 0/0/5
LEAD—Pig, Spanish	ton	9/16/3 9/17/6
English com. brands		9/17/6 10/0/0
Sheet, English, 6 lbs. per sq. ft. and upwards		10/10/0 10/15/0
Pipe		12/0/0 0/0/0
ZINC—English sheet	ton	20'5/c 20/10/0
Vieille Montagne		22/0/0 0/0/0
TIN—Straits		80/15/0 81/5/0
Australian		82/5/0 82/15/0
English Ingots		84/10/0 85/0/0
Banca		88/0/0 0/0/0
Billiton		82/0/0 0/0/0

OILS.

Linseed	ton	22/0/0 23/0/0
Cocoanut, Cochin		29/5/0 29/10/0
Do. Ceylon		26/15/0 27/0/0
Palm, Lagos		26/0/0 0/0/0
Rapeseed, English pale		24/5/0 24/10/0
Do. brown		22/15/0 23/0/0
Cottonseed ref.		22/0/0 0/0/0
Oleine		22/0/0 23/10/0
Lubricating, U.S.		4/0/0 5/0/0
Do. refined		5/10/0 12/0/0
TAR—Stockholm	barrel	0/18/6 0/0/0
Archangel		0/12/6 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.*

BARNSLEY.—Accepted for the erection of cottage, offices, workshops, sheds, storerooms, &c., Beckett-square, for the Town Council. Mr. J. Henry Taylor, C.E., Borough Surveyor St. Mary's-place, Barnsley:—

Carpenter, &c.—Robinson & Son	£546 5 3
Slater and Plasterer.—E. Fleming & Son	248 15 0
Ironfounder.—Needham Bros., & Brown	239 0 0
Plumber and Glazier.—J. Snowdon & Son	100 14 0
Painter.—T. L. Stephenson & Son	40 0 0

[All of Barnsley.]

BRADFORD (Yorks.).—For the erection of premises, Sunbridge-road, for the Bradford Provident Industrial Society, Limited. Messrs. Rycroft & Firth, architects, Bank-buildings, Manchester-road, Bradford:—

Mason's Work.—Birkley & Son, Wyke	Total— £8,231 10
Joiner's Work.—Co-operative Cabinet Makers, Bradford	
Plumber's Work.—M. Slinger, Bradford	
Plumber's Work.—W. H. Hargreaves, Bradford	
Slater's Work.—Hill & Nelson, Bradford	
Painter's Work.—W Townson, Bradford	
Ironfounder's Work.—Roberts & Co., Dudley-hill	

BRITON FERRY.—For the erection of our houses at Briton Ferry, Glamorgan. Mr. Jno. C. Jones, Briton Ferry, architect:—Messrs. Mends & John, Briton Ferry £918 0 0

[Original tender £980, cementing outside deducted.]

CAMBERLEY (Bagshot).—Residence for Col. Cubitt. Mr. Geo. Sherrin, architect, 33, Finsbury-circus. No quantities supplied:—

Geo. Gray	£4,790	F. P. Groome	£3,390
Sharien & Co.	3,493	W. Watson	3,188
J. W. Falkner	3,487	Thornsett & Kingham	3,148

CHIPPENHAM.—For farm house, cottage, stables, piggeries, and cow-house at "Luckham," for the executors of the late Mr. R. Walmesley, under the superintendence of Mr. Frederick Colyer, architect, 28, Great George-street, Westminster, S.W. Quantities by Messrs. R. L. Curtis & Sons, 119, London-wall, E.C.:—

S. G. Bird	£2,690	W. Webb	£2,500

FULHAM.—For new roads, for the Vestry of the Parish of Fulham. Mr. W. Sykes, Surveyor:—

CONTRACTOR.	ARCHEL-ROAD, SEC. II.				ARCHEL-ROAD, SEC. III.				CROSS-ROAD.				DORNCLIFFE-ROAD, SEC. I.				CRESFORD-ROAD.				GREYHOUND-ROAD, SEC. V.			
	Roadway.	York.	Adamant.	Imperial.	Roadway.	York.	Adamant.	Imperial.	Roadway.	York.	Adamant.	Imperial.	Roadway.	York.	Adamant.	Imperial.	Roadway.	York.	Adamant.	Imperial.	Roadway.	York.	Adamant.	Imperial.
	£	£ s.	£ s.	£	£	£ s.	£ s.	£	£	£ s.	£ s.	£	£	£ s.	£ s.	£	£	£ s.	£ s.	£	£	£ s.	£ s.	£
Nowell & Robson	290	199 0	—	—	157	99 0	—	—	275	140 0	—	—	253	139 0	—	—	323	177 0	—	—	97	143 0	—	—
E. Parry	—	—	—	—	175	110 0	—	—	300	150 0	—	—	263	142 0	—	—	363	190 0	—	—	111	150 0	—	—
G. Wimpey	228	192 10	144 0	—	144	98 10	74 0	—	268	136 0	103 0	—	230	138 10	104 0	—	328	181 0	136 0	—	93	140 0	105 0	—
E. Rogers & Co.	252	215 0*	—	—	152	110 0*	—	—	253	155 0*	—	—	257	155 0*	—	—	363	205 0*	—	—	—	—	—	—
J. Mears	245	—	—	—	154	—	—	—	247	—	—	—	230	—	—	—	345	—	—	—	—	—	—	—
A. Brickell	200	—	—	—	100	—	—	—	250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Woodham, Fry, & Fry	—	195 0	136 10	—	—	70 0	70 0	—	—	150 0	105 0	—	—	145 0	101 10	—	—	195 0	136 10	—	—	157 10	110 5	—
Imp. Stone Co.	—	—	—	149	—	—	—	75	—	—	—	109	—	—	—	105	—	—	—	141	—	—	—	110

* These amounts will be reduced to £192, £97, £138, £140, and £187 respectively if the Roadway Tenders are accepted.

Passage between Rylston and Coomer roads.

G. Wimpey £120 0 0 | E. Parry £125 0 0 | Woodham, Fry, & Fry £144 0 0

CROSS KEYS (Mon.).—For the erection of school and class-rooms, for the Trustees of the Wesleyan Methodist Connexion. Mr. Geo. Rosser, architect, Victoria-buildings, Abercarne. Quantities by Mr. R. L. Roberts, Newbridge:—

A. P. Williams	£1,160 0 0	J. Jenkins	£719 0 0
D. C. Jones & Co.	857 0 0	C. F. Morgan	710 0 0
W. C. Forward	800 0 0	Albert Richards, Newbridge (accepted)	674 0 0
Newby & Co.	778 1 11		

CROYDON.—Enlargement of the Beulah-road Schools, for Croydon School Board. Mr. Robert Ridge, architect:—

W. Smith	£1,400	Huntley Bros.	£1,237
Hubbard	1,280	J. Smith & Sons	1,189
Taylor	1,275	Sedgwick	1,180
Bullock	1,252	Akers*	1,093
Bower	1,244	*Accepted.	

DONCASTER.—For the erection of two shops,* Baxter-gate, for the Corporation of Doncaster. Mr. William H. R. Crabtree, C.E., Borough Surveyor, 3, Priory-place, Doncaster. Quantities by the Borough Surveyor:—

William Anelay	£983 17 0	Henry Wortley	£761 12 8
George Motteam	982 6 2	Samuel Beastall	747 8 6
William Johnson	815 18 8	Frank Beastall, Doncaster†	736 4 6
H. Arnold & Son	809 2 4	†Accepted.	
Mullins & Richardson	791 9 8		

* Exclusive of the foundations, which were put in by the Corporation.

DOWNPATRICK (Ireland).—For the extension of a main sewer at Castlewellan, for the Union Guardians. Mr. John McAleenan, C.E. Quantities by same:—

James McAleenan, Castlewellan	£26 10 0

DURHAM.—For the construction of 348 yards 8-in. and 6-in. pipe sewer at Pity Me, near Framwellgate Moor, for the Rural Sanitary Authority. Mr. George Gregson, Surveyor, 43, Western Hill, Durham. Quantities by the surveyor:—

Thomas Dixon	£78 16	John Carrick, Durham*	£66 0
		*Accepted.	

ECCLES (Lancs.).—Accepted for the execution of about 1,100 square yards grit sett paving, Barton-lane, for the Corporation. Mr. A. C. Turley, Borough Surveyor, Town Hall, Eccles:—

Messrs. Snape & Sons, Eccles .... 5s. 5d. per square yard.

GATESHEAD.—Accepted for paving and cementing Camborne-place, Prest, and other streets, for the Corporation. Mr. J. Bower, C.E., Borough Surveyor, Town Hall, Gateshead:—

Camborne-place.

Paving.—G. E. Simpson, Newcastle	£264 15 7
Cementing.—T. Rule, jr., Gateshead	26 2 2

Prest-street (Remaining Half).

Paving.—J. W. Robson, Newcastle	£260 15 6
Cementing.—T. Rule, jr., Gateshead	48 15 0

Hereford-street.

Cementing.—Wm. Nevison, Gateshead	£41 15 8½

GUILDFORD.—For alterations, &c., to the Town Hall, for the Town Council. Mr. F. T. Maltby, C.E., Borough Surveyor, High-street, Guildford:—

Robert Smith	£364 0	James Smith, Guildford*	£307 0
F. H. Billimore	335 17	*Accepted.	

HORSHAM.—For the erection of house and shop, West-street, for Mr. H. Boorer. Mr. C. H. Burstow, architect, Oakhill-road, Horsham:—

Joseph Potter	£750	Peter Peters, East-street*	£660
Mark Etheridge	604	George Sharp	655
		*Accepted.	

HOUGHTON-LE-SPRING.—For the erection of board-room and waiting-rooms at the workhouse, for the Union Guardians. Mr. Frank Caws, architect, 22, Fawcett-street, Sunderland. Quantities by Messrs. Boreham & Morton, Baltic-chambers, Sunderland:—

M. H. Draper	£1,784 2 9	J. Hislop	£1,596 5 8
J. Howe	1,706 12 10	T. F. Shaftoe & Partners	1,477 0 0
J. Oates	1,687 0 0	R. J. Harrison	1,467 0 0
D. & J. Ranken	1,630 0 0	Geo. Gradon & Son, Durham (accepted)	1,450 0 0
C. Barham & Son	1,630 9 0		
R. Hudson	1,548 0 0		

HUDDERSFIELD.—For the erection of three dwelling-houses, Houses Hill, Kirkheaton. Mr. J. Berry, architect, 9, Queen-street, Huddersfield:—

Mason.—H. Pearson, Kirkheaton, Huddersfield	Total £500.
Joiner.—L. C. Littlewood, Hopton, Mirfield	
Plumbers.—Sanderson Bros., Paddock, Huddersfield	
Slaters.—Pickler Bros., Huddersfield	
Plasterer.—O. Roberts, Lepton, Huddersfield	
Painter.—E. Jagger, Grange Moor, Wakefield	

KEIGHLEY.—For the erection of porter's lodge and receiving wards, sick wards, &c., at Workhouse, Fell-lane, for the Union Guardians. Messrs. Judson & Moore, architects, Burlington Chambers, Keighley:—

Masons' and Excavators' Work.—Joseph Waterhouse, Devonshire-street, Keighley	£1,736 0 0
Carpenters' and Joiners' Work.—Timothy Hird, South-street, Keighley	570 0 0
Slaters' Work.—Wm. Thornton, Bingley	143 0
Plumbers' Work.—Jos. Harrison, Bridge-street, Keighley	430 0 0
Plasterers' Work.—Jos. King & Co., Keighley	98 10 0
Painters' Work.—F. Petty, Keighley	33 4 4

KINGSLEY (Staffs.).—For the erection of school buildings, &c. Mr. Larner Sugden, architect, Leek:—

First Tendering.†

James Heath	£2,891 0 0	W. Ball	£1,521 10 8
Thomas Grace	1,955 6 0	J. Fielding	1,443 8 6
C. Corues	1,895 0 0	T. S. Bromage (too late)	1,501 15 2
W. Alcock	1,575 9 8		

Second Tendering (Reduced Quantities).

W. Ball	£1,490 18 5	W. Alcock	£1,411 6 8
J. Fielding	1,425 15 6	W. Alcock, Cheadle*	1,390 0 8

* With G. T. Stevenson, Leek, Plumber (accepted).

[† Architect's Preliminary Estimate, £1,538 11 8.]

LLANDUDNO.—For the execution of certain works for the protection of the promenade for the Improvement Commissioners. Mr. E. P. Stephenson, surveyor, Llandudno:—

Chas. Braddock	£700 11 6	R. L. Roberts, Llandudno*	£495 0 0
W. Kinnard	695 15 6	*Accepted.	
John Weston	438 12 0		

LONDON.—For the construction of a pipe sewer (3,807 yards), manholes, &c., for the Hendon Local Board. Mr. S. S. Grimley, Engineer, The Burroughs, Hendon, London, N.W.:—

	If "Best London Stoneware Pipes" used.	If "Best Country Pipes" used.
J. T. Bellamy	£8,597 7 6	£8,567 7 6
Rogers & Co.	6,610 8 0	6,285 0 0
J. Dickson	6,077 7 6	5,691 7 0
Cooke & Co.	5,914 9 6	5,594 0 0
W. Neave & Son	5,918 14 6	5,568 14 6
John Neave	5,573 0 0	5,112 0 0
W. Walker	5,516 16 6	5,116 4 0
A. Kellet	5,512 0 11	5,372 0 11
G. Bell	5,185 8 0	4,785 0 0
William Oldman	5,130 0 0	4,700 0 0
R. Ballard	4,978 14 10	4,697 0 0
F. Reeks	4,775 10 11	4,290 14 4
C. W. Killingback & Co., Camden Town (accepted)	4,187 8 7	4,017 8 7

LONDON.—For rebuilding No. 49, Hayles-street, St. George's-road, S.E., for the trustees of the Hayles Estate. Messrs. Waring & Nicholson, architects, 55, Parliament-street, Westminster:—

Lapthorne & Co.	£997	G. Britain	£869
B. E. Nightingale	993	J. K. Ford	864
C. Ansell	935	Wm. Smith	725
T. Hooper	874	R. C. Scutt	700

LONDON.—Warehouse, 54, Castle-street, Southwark, S.E., for Messrs. W. H. Willcox & Co. Messrs. Treadwell & Martin, architects:—

George Newton	£2,665	W. & H. Castle	£2,497
T. Rider & Son	2,506	Nightingale (accepted)	2,362

LONDON.—For paving Fellbrigg and Bawdale roads, Lordship-lane, for the Camberwell Vestry. Mr. O. S. Brown, Surveyor, Works Department, Vestry Hall, Camberwell, London, S.E. Quantities by the Surveyor:—

	Fellbrigg-road.	Bawdale-road.
W. Wadey	£761 18 0	£862 2 6
S. Hudson	747 8 6	860 4 3
T. Etheridge	705 13 6	825 13 6
T. Adams	699 10 4	800 18 6
Mowlem & Co.	665 3 8	758 9 6
R. Mayo	649 19 8	750 12 0
A. J. Catley, Lloyd's-square, W.C. (accepted)	647 14 0	739 12 0

LONDON.—For rebuilding No. 173, High-street, Shoreditch, E., for Mr. J. W. Stutter. Mr. J. W. Brooker, F.R.I.B.A., architect, 13, Railway Approach, London Bridge, S.E.:—

Wilson	£2,900	Edwards & Medway	£1,737
Rayner	2,375	Goodall	1,723
Cogman	1,981	Battley, Sons, & Holness*	1,519
Burman & Son	1,746	*Accepted.	

LONDON.—For rebuilding Nos. 36 and 38, Dock-street, E., for Mr. Douglas White. Mr. J. W. Brooker, F.R.I.B.A., architect, 13, Railway Approach, London Bridge, S.E.:—

J. Sparks & Sons	£1,700 0 0

(Revised tender accepted).

LONDON.—For rebuilding No. 174, High-street, Shoreditch, E., for Mr. W. R. G. Roebuck. Mr. J. W. Brooker, F.R.I.B.A., architect, 13, Railway Approach, London Bridge, S.E.:—

Rayner	£1,975	Burman & Sons	£1,672
Edwards & Medway	1,847	Cogman	1,631
Wilson	1,799	Battley, Sons, & Holness*	1,472
Goodall	1,690	*Accepted.	

NOTTINGHAM.—For the erection of dwelling-house, bakery, &c., in Foxhall-road. Mr. Hedley J. Price, A.R.I.B.A., architect, 10, Clinton-street, Nottingham. Quantities by the architect:—

W. Gill & Son	£484 10 0	Jno. Musson	£455 0 0
Thos. Cuthbert	480 0 0	Gilbert & Gabbitass	455 0 0
J. J. Adams	476 0 0	Jno. Cooper	451 11 6
S. A. Bell	473 0 0	T. Whittaker	449 0 0
Thos. Barlow	460 18 6	Henry Scott & Son	437 10 0
Jas. Wright	460 0 0	F. Wartnaby	406 10 0
W. T. Norris	459 0 0	F. Lee, Nottingham*	395 16 0
		*Accepted.	

PENGE.—For the erection of Penge New Tabernacle and alterations to existing chapel, Maple-road, Penge, S.E., for the trustees. Mr. J. W. Brooker, F.R.I.B.A., architect, 13, Railway-approach, London Bridge, S.E.:—

J. Allan & Sons (revised tender accepted)	£4,315

PERTH (N.B.).—For causewaying, &c., North Methven and Princes streets, for the Police Commissioners. Mr. Burgh Surveyor, City Chambers, Perth:—

	North Methven-street.	Princes-street.
Adam Will	£1,200 0 0	£1,287 17 4
R. C. Brebner	1,115 12 5	1,178 16 4
Pedro Irvine	1,098 2 6	1,122 8 0
G. & R. Cousin	1,078 2 6	1,140 14 4
Alex. Brunton & Son	1,073 8 9	1,023 6 8
John Melloy	1,064 1 3	1,112 9 0
Alex. Gall	1,059 7 6	1,118 11 8
L. & W. MacDonald	900 0 0	992 15 0
D. & R. Taylor, Perth*	900 0 0	947 17 0
	*Accepted.	

PONTYPRIDD.—For the erection of school buildings (intermediate school). Mr. A. O. Evans, architect, Town Hall, Pontypridd. Quantities by architect:—

E. C. Newby	£8,365 14 6	W. Seaton	£7,903 0 0
Stephens & Barstow	8,299 0 0	Evan Williams	7,658 0 0
E. T. Richards	8,088 10 11	Watkin Williams	7,500 0 0
D. C. Jones	7,946 0 0		

RICHMOND (Surrey).—For additions and alterations to the fire-station, Sheen-road, for the Town Council. Mr. E. J. Lovegrove, C.E., Borough Surveyor, Town-hall, Richmond, Surrey:—

J. W. Brooking	£535 0 0	Rochelle, Cover, & Smith	430 11 5
Foord & Son	535 0 0	Soole & Son	430 0 0
Scharien & Co.	523 0 0	Sweet & Loder, Richmond (accepted)	420 0 0
C. Eldridge	512 0 0		

SOUTHAMPTON.—For erection of proposed infants' school, Totton, near Southampton, for the School Board. Messrs. W. H. Mitchell, Son, & Gutteridge, architects, 9, Portland-street, Southampton:—

Reeks	£2,304 0	Nichols (executors of the late)	£2,090 0
Stevens & Co.	2,222 0	T. J. Jukes	2,066 0
Roles & Son	2,214 0	F. Osman, Fourposts, Southampton*	2,050 0
Crook & Sons	2,187 10		
H. Hale	2,187 0		
Light & Sons	2,157 0		

* Accepted, subject to the approval of the Education Department.

SOUTHEND-ON-SEA.—Tenders for Campbell-road and Weston-road improvements. Mr. Copley, Borough Surveyor:—

	Weston-road.	Campbell-road.
Woodhams & Fry	£401 5 6	£777 11 10
G. Wimpey & Co.	339 17 11	683 2 6
W. Wadey	334 19 0	694 19 7
H. Potter	298 17 0	592 3 6
W. Buxton	260 18 2	537 19 9
R. Ballard	251 11 1	644 10 7
J. E. Potter	231 2 1	565 11 10
F. Dupon	229 3 1	537 19 8
W. Merrin	225 17 9	589 9 0
E. & W. Isles, 18, Queen's-road, Wimbledon	214 1 0*	530 13 2½*
W. H. Wheeler	214 15 8	489 17 1

* Accepted.

THORNHILL (Yorks).—Accepted for laying out a sewage farm, excavating 6,000 cubic yards of earth, &c., for the Local Board. The Engineer, Local Board Offices, Thornhill, Yorks:—

Wm. Doleman, Savile-Town, Dewsbury	£766 0 0

YATE (Gloucester).—For laying a new system of drainage and executing certain sanitary improvements at the workhouse, for the Chipping Sodbury Union Guardians. Mr. J. Fletcher Trew, C.E., Clarence-street, Gloucester:—

Ambrose Stephen	£330 0	R. H. Wood	£227 15
Beaven & Son	277 0	W. H. Smith, Clifton*	198 8
Jno. Perkins	233 0		

*Accepted conditionally.

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W. B. (The point is under consideration).—M. & Co. (Shall have attention).

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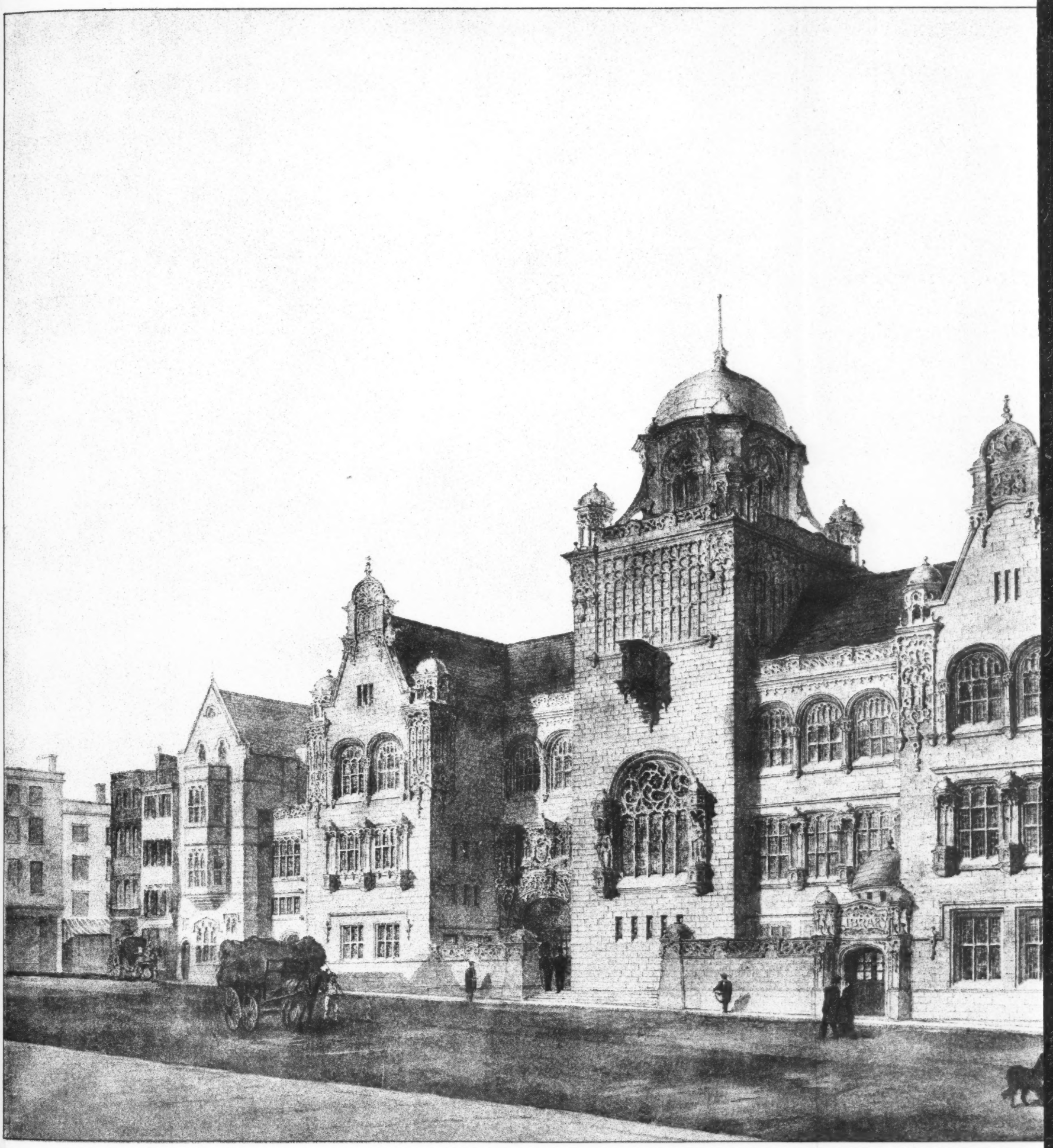

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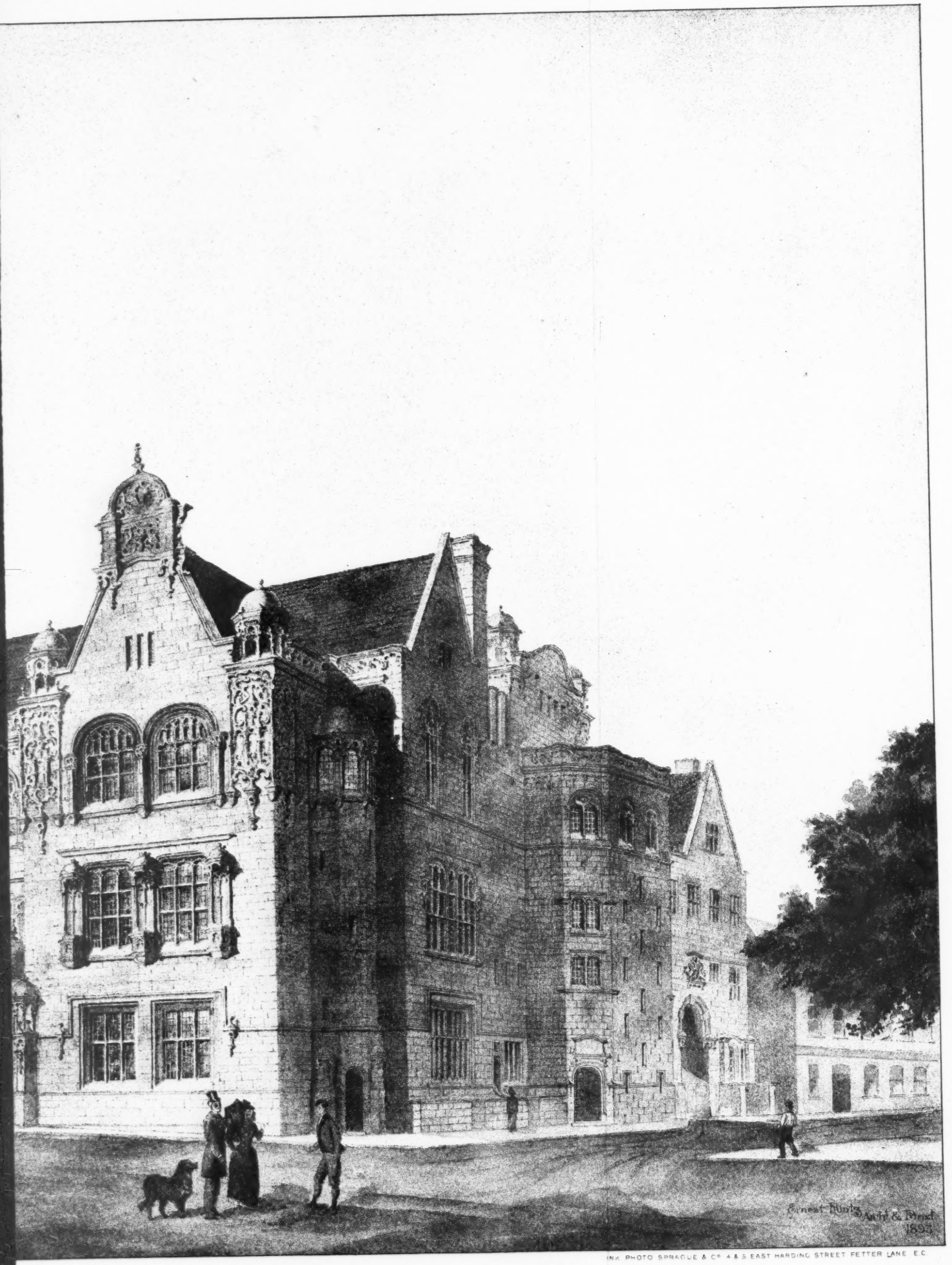

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